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THE
VETERINARY MAGAZINE.

VOL. II. JUNE, 1895. No. 6.

ANESTHESIA IN THE HORSE.

BY DR. SIMON J. J. HARGER,
Professor of Anatomy and Zoötechnics, Veterinary Department, University of Pennsylvania.

It is not my intention to give a classical description of the methods and the agents employed in anesthesia, but rather to call attention to some practical facts that are of value in the veterinarian's daily practice. Compared with the rôle played by anesthetics in human surgery, their employment by the veterinarian has been quite insignificant. This, no doubt, has been due to the inconvenience of administering them as well as the dangers which were supposed to attend this practice.

Local anesthesia with such agents as cocain, is to be preferred in minor operations and in all other cases in which it is admissible. In some of the major operations, such as those in the larynx, the abdominal organs, hernia, difficult parturition, etc., anesthesia is almost indispensable; even in other operations in which it has not been generally employed it may to-day be used with advantage. The fear of disastrous results which formerly precluded its more general employment is gradually abating, and it bids fair in the future to become a valuable adjunct to many operations which are now performed under the ordinary methods of restraint. Whilst it is probable that the sense of pain is less acute in the lower animals than in man, being in relation with the specialization of the functions of the nerve centres, yet when the operator has the advantages of an infirmary or if the conditions are favorable and the requisite number of assistants are at his command, the surgeon can often render an operation less laborious to himself and less painful to the animal by making use of pain-relieving agents.

The agents which have been employed to produce narcosis in the horse are intra-venous injections of chloral hydrate, one-half to one ounce, into the jugular vein, ether, mixtures of equal parts of chloroform and ether; sulphuric ether, chloroform and alcohol, 3, 2 and 1 parts respectively; morphia as an adjuvant to chloroform, etc.

Négotin[1], in a very extensive series of experiments upon animals found that chloroform is preferable among the list of anesthetics for the production of narcosis in the horse.

I have employed chloroform more or less extensively for this purpose and it has given such good satisfaction that I have no good reason to substitute for it any other agent at present in the market. One fatal case of chloroformization has occurred in my practice, but this does not in my opinion militate against its use. Although not thoroughly examined previous to commencing the administration of the chloroform, the general condition of the animal was such as to cause me to remark before he was under its influence, that I feared a fatal result and, besides, I was obliged to entrust its administration to assistants who perhaps did not have the requisite experience. Möller[2] narcotized between three and four hundred horses with chloroform without a single accident. The various mixtures of chloroform, ether, alcohol, etc., require from three to four times as much time to produce narcosis as does chloroform alone.

The method of administering chloroform is very simple, especially if one has the advantage of an operating table. It is a modification of that employed by Möller, and I generally handle the sponges and flannel myself, although this may be entrusted to a competent assistant when the operation is a delicate one in order to avoid nervousness of the hand.

The horse fed on mashes the day before and no feed at all on the day of operation, so as to have the stomach and bowels empty, is, of course, previously cast with the ordinary methods; and in spite of all special contrivances no apparatus is for me preferable to the English hobbles. (Fracture of the vertebræ may take place in spite of all precautions.)

The head being well extended and the nostril and upper lip smeared with oil or cosmolin, a soft sponge is packed into the upper nostril and covered with a double piece of flannel about

[1] *Annales de Méd. Vét.*

[2] "Lehrbuch der allgemeinen Chirurgie und Operationslehre."

six inches square. The cork of the bottle having a small notch cut on the side, the chloroform is then dropped, drop by drop, on the flannel cloth with now and then an intermission in order not to saturate the sponge too much, thus allowing the chloroform to run over the lips or into the nostril. I have never seen the mucous membrane of the nose affected by the local action of the agent, though the epidermis may peel off in spots. Squibb's chloroform is to be preferred. It is safer and more rapid in its action and saves time. The various and ornamental patented chloroform bags are worse than useless; the quantities of chloroform given can not be accurately gauged and they should find no place in text-books or in one's practice.

At the end of about a minute, a second small sponge is introduced into the lower nostril, at first very cautiously and afterward more firmly. The amount of inspired air can thus be regulated at will with this sponge, according to the character of the pulse and the respirations, by drawing it out or re-inserting it. The free admixture of air with the chloroform is not as necessary in the horse as in the human being, since the cardiac and respiratory nerve centres are not as sensitive in the former as in the latter.

Soon after the commencement of the administration of the chloroform the animal will now and then struggle and toss his head, voluntary efforts to resist the restraint and the irritation of the chloroform. Here the head should be firmly held that the sponges may not be dislodged from the nostrils. Then follow successively a variable period of quietude, spasmodic contractions of the eyes, rolling of the eyeballs; then clonic convulsions, the stage of excitation, closing of the eyes, loss of the corneal reflex and general muscular relaxation. As long as there is a corneal reflex, the administration of the chloroform may be continued, although for complete anesthesia I depend rather upon the relaxation of the members than upon the sensibility of the conjunctiva.

When the pulse becomes small, rapid, and perhaps irregular, and the respirations shallow and at long intervals, the chloroform and the sponges should be immediately withdrawn. Watching the respirations is as important as the indications furnished by the pulse. Chloroform may destroy life by arrest of respiration. In one fatal accident the heart continued to beat some time after the respiration had ceased.

In extreme cases I have seen it necessary to resort with success to artificial respiration, and hitting the animal with the hand or a whip. The chest must be relieved from all restraint from straps, etc., and two assistants forcibly press against the side of the thorax with their hands and one knee at short intervals, and, if the animal is breathing, synchronously with the expiration. In rare cases, if the agent is given for a long time and the system is well saturated with it, the shallow, infrequent respiration with threatened arrest of breathing may continue for an hour after the operation, and necessitate the above-mentioned procedures. The stertorous breathing due to the vibrations of the soft palate is not at all alarming, and the animal may in a measure breathe through the mouth.

The quantity of chloroform required to produce narcosis varies with the age, sex, temperament and idiosyncrasy. Geldings require more than stallions and mares. One hundred and twenty-six horses chloroformed by Möller, required on an average three and one-half ounces and a duration of twenty minutes; some of these required from thirty to forty minutes; yearlings and two-year olds required one-half to three-fourths of an ounce in seven to eight minutes. Stallions, mares and geldings required respectively eighteen, nineteen and twenty-two minutes. In some cases seven to eight ounces of chloroform were required.

The average time consumed in producing anesthesia is from seven to ten minutes. In a few of my cases I have recorded some facts as to the time required and the quantity of chloroform used.

Observation I.—Gelding, weight 1200 pounds. Chloroform four ounces by weight; the time required to induce narcosis was ten minutes, and its duration was twenty minutes; maximum pulse and respirations, sixty-two and eighteen, respectively.

Observation II.—Gelding, in weight 1250 pounds. Removal of eyeball; chloroform three ounces; time required for anesthesia, nine minutes.

Observation III.—Nervous temperament; 1150 pounds; chloroform three ounces; time required, ten minutes.

Observation IV.—Mare, 1000 pounds. Arytenectomy, chloroform three and one-half ounces; time, seven minutes.

Observation V.—Thoroughbred stallion. Arytenectomy, chloroform four ounces; time, seven minutes.

Observation VI.—Mare, sixteen years; standard-bred; chloroform (Squibb's) two ounces; time, eight minutes.

The above observations were nearly all made with the commercial chloroform; had Squibb's preparation been employed, the quantity would have been materially less. In my first cases, the quantity of chloroform administered and the time acquired to produce anesthesia, were much greater than in the above observations.

Practice leads toward perfection. In some instances the narcosis was maintained for two hours; in another, the animal broke his back in spite of the anesthesia. All things being equal, chloroform commends itself in many of the major operations, and we need not apprehend the dangers formerly coincident with this practice.

NOTES ON PARASITES—38–39.

By Ch. Wardell Stiles.

38. Preliminary Note to "A Revision of the Adult Leporine Cestodes."

The discovery of an armed larval cestode in the intestine of rabbits, and the close relationship existing between the tapeworms of rabbits and those of man, cattle, sheep and horses, rendered it necessary to submit the leporine cestodes to an anatomical revision. This revision is now completed (ca. 50–70 pages of type and 18 plates), and will, I hope, appear before January 1, 1896, in the proceedings of the United States National Museum. Pending its appearance I take the liberty of publishing a few of my conclusions in a preliminary note.

(*a*) By comparing the segments of different ages in tapeworms with alternate pores, more particularly *Thysanosoma Giardi* from sheep, *Andrya americana* n. sp. from the yellow-haired porcupine and *Andrya americana leporis* n. var. from American rabbits, I conclude that the median line of some cestodes is the seat of a very active growth resulting in an

increase in the breadth of the segments. This is shown by the fact that the ovary, which is at first median, is found further to the right or left of the median line respectively in each succeeding segment, while it retains approximately its same relative position to the longitudinal canals.

This obtains more strictly in *Th. Giardi* than it does in *Andrya americana*, for in the former the ovary retains a constant relation to the lateral canal, while in the latter the space between the ovary and lateral canal is considerably increased distally. Evidently no particular narrow longitudinal zone can be named as the zone of lateral growth in all cestodes, as is shown by a comparison of a large number of species. As a rule, however, the chief zone of lateral growth is the median field, and in most of the double-pored forms the chief zone lies between the ovaries. In a few double-pored forms, however, there is considerable increase in width between the ovaries and lateral canals, and in a few forms there is considerable increase in the width of the lateral field.

(*b*) The armed larval cestode which I mentioned in Note 31 is not the young of an anoplocephaline tapeworm, as Curtice, Braun, and I have heretofore assumed, but represents the cysticercoid of the single-pored cestode referred to in Note 36. This parasite represents a new species of the genus *Davainea*, and I propose to name it *D. Salmoni*, dedicating it to the Chief of the Bureau of Animal Industry.

(*c*) The double-pored cestode with occasional single pores, described in Note 36, is *Ctenotænia variabilis* var. *angusta*.

(*d*) I have also found some very young stages of an unarmed cestode in the intestine of the Cotton-Tail Rabbit, which probably belong to *Ctenotænia variabilis* n. sp. This young stage corresponds to what we may expect to find as the larval form of *Moniezia expansa* of cattle and sheep, and I doubt whether it will be possible to distinguish it from the young of that species. This fact renders the question as to the origin of the tapeworms of cattle and sheep more complicated than it was formerly supposed to be, *and demands the strictest experimental proof on the part of any author who suspects that he has solved the mystery of the life-history of ovine and bovine cestodes.*

(*e*) The head of a cestode increases in size after the parasite reaches its final host, as is shown by a comparison of the younger specimens.

(*f*) With Blanchard I consider *Tænia wimerosa* Moniez, 1880, of rabbits an *Anoplocephala*. It is very closely related to the tapeworms of horses, and can easily be mistaken for *A. mamillana*.

(*g*) None of the tapeworms thus far described from European rabbits have as yet been found in America. The American forms which have been published as "*Tænia pectinata*," must be distributed over several new species which are entirely distinct from the European "*Tænia pectinata*" (=*Ctenotænia pectinata* [Goeze, 1782 partim Riehm, 1881] Railliet, 1893).

(*h*) Regarding Railliet's new genus *Andrya* from rabbits and its relation to Blanchard's genus *Bertia* from anthropoides, I am not in a position to express a positive opinion. I hope to examine the types while in Germany this summer, and to come to some conclusion regarding this question. In the mean time the forms which I place in *Andrya* are placed there provisionally.

(*i*) The following synopsis will aid in making a specific determination of all the leporine cestodes known at present. Of the forms mentioned I have studied all except *Andrya rhopalocephala* and *A. cuniculi;* the data given for these two species are based upon Riehm (1881). The form given as *Andrya americana leporis* possibly represents a good species, but my material does not warrant my raising it above varietal rank at present.

Acknowledgments for material will be made in my final paper.

Key to Adult Leporine Tapeworms.

1. Head armed with two rows of hooks on the rostellum and numerous hooks on the suckers; genital pores single; body rarely over 3 mm. broad . . . . . Genus: *Davainea*, 2.
   Head unarmed; genital pores single or double; body nearly always more than 3 mm. broad; egg with pyriform body . . . . . 3.

Sub-family CYSTOIDOTÆNIINÆ.

2. Suckers not invaginated; genital pores alternate; eggs grouped 3–15 in egg-capsules; strobila attains 85 mm. or more in length by 3 mm. in breadth. Hosts: Jack rabbits (*Lepus melanotis*) and the cotton-tail rabbit (*L. sylvaticus*) . . . . . *D. Saimoni* n. sp.
   Suckers retractile, invaginated (always?); genital pores unilateral; eggs not grouped; strobila attains 105 mm. long by 3 mm. broad. Host: Arizona cotton-tail (*L. arizonæ*) . . . . . *D. retractilis* n. sp.

Sub-family ANOPLOCEPHALINÆ.

3. Genital pores single, lateral; uterus transverse . . . . . 4.
Genital pores double, lateral; uterus transverse . Genus: *Ctenotænia*, 8.

4. Genital pores alternate . . . . . Genus: *Andrya*, 5.
Genital pores unilateral, dextral; cirrus large, attaining *ca.* 0.5 mm. in length, dorsal of vagina; testicles 15–30 in each segment, left of median line, appear in 2d segment and atrophy by the 15th; ovary appears in about the median line of youngest segment and atrophies earlier than the testicles; receptaculum seminis elongate, dextral to median line; uterus ventral with proximal and distal sacs; body attains ca. 10 mm. in length by 1.5–2.5 mm. in breadth, and contains from 10 to 48 segments; proximal segments frequently asymmetrical. Host: European rabbit (*Lepus cuniculus*) and mountain hare (*L. variabilis*). It may easily be mistaken for *A. mamillana* of the horse . . . . . *Anoplocephala wimerosa* (Moniez, 1880), R. Bl., 1893.

5. Body attains 60–100 cm. in length; genital pores generally unilateral for some distance and then alternate; genital organs appear in *ca.* 100th segment. European . . . . . 6.
Body attains 30–50 mm. in length; genital pores generally regularly alternate; genital organs appear in segments immediately back of head; testicles arranged in a band across the distal portion of the segment. American . . . . . 7.

6. Genital pores near posterior corner of segment; head ca. 1 mm. in diameter; testicles few (*ca.* 20) in number, confined chiefly to aporous side of median field; strobila attains 60–80 cm. in length by 5 mm. in breadth. Host: Common hare (*L. timidus*) . . . . . *Andrya rhopalocephala* (Riehm, 1881), Rail., 1893.
Genital pores in about the middle of the lateral margin; head *ca.* 0.5 mm. in diameter; testicles ca. 50 in number, scattered through entire median field; strobila attains 100 cm. in length by 8 mm. in breadth. Host: Wild rabbit (L. cuniculus) . . . . . *Andrya cuniculi* (R. Bl., 1891), Rail., 1893.

7. Genital pores in posterior half of lateral margin; cirrus-pouch *ca.* 0.5 mm. long; posterior segments show a tendency to become narrow and thick; strobila attains 33 mm. in length by 0.6 mm. in breadth, and contains *ca.* 90 segments. Host: Yellow Haired Porcupine (*Erethizon epixanthus*) . . . . *Andrya americana* n. sp.
Genital pores in about the middle of the lateral margin; cirrus-pouch *ca.* 0.4 mm. long; posterior segments do not become narrow; strobila attains 23–47 mm. in length by 5–6.5 mm. in breadth, and contains 60–95 segments. Host: Rabbit (*Lepus sp?*) . . . . . *A. americana leporis* n var.

8. Cirrus-pouch generally pyriform, with distinct outline, and swollen proximally by the vesicula seminalis . . . . . Marmotæ-group, 9.
Cirrus-pouch, tubular, resembling the nozzle of a hose, of equal or nearly equal diameter throughout its entire length and not swollen proximally to hold a prominent vesicula seminalis . Pectinata-group 12.

9. Testicles arranged in a band extending across the median field . 10.
Testicles comparatively few in number, arranged in two groups, one corresponding to each ovary; cirrus-pouch small, 0.16 mm. long, scarcely reaching the longitudinal nerve; pore in distal part of lateral margin; female glands near ventral canal; dorsal canal dorsal or dorso-lateral of ventral canal; strobila attains 80 cm. in length by 10 mm. in breadth. Host: Rabbits (*Lepus cuniculus ferus, et domesticus*), Europe . . . . . *Ct. Leuckarti* (Riehm, 1881), Rail., 1893.

10. Testicles extend laterally of the ovaries . . . . . 11.
Testicles confined to distal portion of segment between the ovaries; cirrus-pouch *ca.* 0.5 mm. long by 0.17 mm. broad, crosses the canals; female glands some distance from lateral canals; transverse uterus single with longitudinal pouches; dorsal canal between ventral canal and nerve; strobila may attain 112 mm. long by 5–13 mm. broad. Hosts: Marmot (*Arctomys marmota*), Europe . . . . . *Ct. marmotæ* (Frölich, 1802), Rail., 1893.

11. Cirrus-pouch very large, 1.12 mm. long by 0.32 mm. broad, female glands not far removed from dorsal canal; several accessory ventral canals; strobila may attain 80 cm. long by 15 mm. broad. Hosts: Wild rabbits (*Lepus cuniculus ferus*), Europe . . . . . Ct. Goezei (Baird, 1853), Rail., 1893.
Cirrus-pouch small 0.24 mm. long; female glands removed from dorsal canal; dorsal canal lateral or dorso-lateral of ventral canal; rec. sem. very large; segments overlapping; strobila attains 40 mm. long by 5.5 mm. broad. Host: Prairie gopher (*Geomys bursarius*), North America . . . . . *Ct. præcoquus* n. sp.

12. Cirrus-pouch *ca.* 1 mm. long, extends some distance median of longitudinal canals; testicles arranged in a band in distal portion of median field, extending beyond ovaries from canal to canal; ovary some distance removed from canals; uterus single (always?); strobila attains 40 cm. in length by 8–10 mm. broad. Hosts: Common hare (*Lepus timidus*) and mountain hare (*L. variabilis*), Europe . . . *Ct. pectinata* (Goeze, 1782), Rail., 1893.
Cirrus-pouch not over 0.5 mm. long extends scarcely median of lateral canals; generally two uteri, frequently one uterus. Hosts: *Lepus*, North America . . . . . 13.

13. Testicles in two groups, one for each ovary, extend laterally of ovary but absent from median field; strobila attains 57 mm. or more in length by 10 mm. in breadth. Host: Cotton-tail rabbit (*L. sylvaticus*) . . . . . *Ct. perplexa* n, sp.
Testicles in a band confined to distal portion of median field between the ovaries; strobila attain 100–180 mm. in length by 10 mm. in breadth. Hosts: Cotton-tail rabbit (*L. sylvaticus*) and marsh-hare (*L. palustris*) . . . . . *Ct. variabilis* n. sp. 14

14. Strobila nearly always more than 3 mm. broad; posterior flap of segments nearly straight; segments slightly imbricate; genital pore in about the middle of the lateral margin. Host: Cotton-tail (*L. sylvaticus*) . . . . . *Ct. variabilis* n. sp.
Body nearly always more than 3 mm. broad; posterior flap of segments lobed; segments imbricate; genital pores generally in distal half of lateral margin. Host: Marsh hare (*L. palustris*) . . . . . *Ct variabilis imbricata* n. var.
Body rarely over 2 mm. broad; posterior flap straight; segments not imbricate; genital pore generally in distal portion of lateral margin, generally double, occasionally single. Host: Cotton-tail Rabbit (*L. sylvaticus*) . . . . . *Ct. variabilis angusta* n. var.

Types of new forms will be deposited in the Helminthological Collection, United States National Museum.

Bureau of Animal Industry, United States Department of Agriculture, July 25, 1895.

39: *Pyrosoma*, *Apiosoma* and *Piroplasma*—Generic names of the Texas-Fever Parasite.

In a recent number of the C. f. B. u. P. (Vol. XVII. p. 554–556) Wandolleck discussed the generic name which has been proposed for the parasite of Texas-fever. Upon the ground that *Pyrosoma* Smith and Kilborne, 1893, is pre-occupied by *Pyrosoma* Péron, 1804, he suppressed Smith's generic name and proposed *Apiosoma* Wandolleck, 1895, as a substitute. Unfortunately this generic term is also pre-occupied, as Blanchard applied it to a parasitic protozoon in 1885. Almost simultaneously with the appearance of Wandolleck's article (May 4th) in Germany, Patton proposed the name *Piroplasma*, Patton, 1895, (American Naturalist for May, p. 498—actual date of publication was May 13.) *Piroplasma bigeminum* (S. & K., 1893), Patton, 1895, is at present, therefore, the correct scientific name for the parasite of Texas-fever.

TRANSLATIONS.

REMARKS UPON THE HISTORY OF THE JUMARTS.

By Dr. P. Hann, Veterinarian.

[Translated by S. J. J. Harger.]

The medical writings of the last century have some vague references upon this supposed animal of variable production, but allied to the equine and asine species, which in many instances are based upon erroneous observations. Our knowledge as to the hybrid between the bull and the mare is a little more clear.

In relation to embryological researches, I have lately studied the interesting work of Spallanzani upon fecundation.

In 1778, Bonnet wrote to Professor de Pavie to inquire whether Achard of Berlin hastened the development of the chick in the egg by means of electricity. He then endeavored to modify the experiment by substituting, in fecundating the egg, electricity for the spermatic filament. Useless to say, the experiment failed, and Spallanzani concluded that the sperm is the only active agent, and that all other animal fluids merely accelerate the destruction of the egg. Upon this latter point this observer, however, made some exceptions, which he expressed as follows:

"One could be hopeful that the fecundation of the egg of the toad with the sperm of another animal of the same genus could be more successful, since the ass impregnates the mare, and, what is more singular, since the female ass is fertile with the bull."

Such a statement on the part of such a learned naturalist as Spallanzani has led me to make some observations upon the proper characters of this supposed remarkable product. I will briefly recall some of these facts, perhaps known to many, but nevertheless interesting by their apparent reality.

Under the name *jumart* or *kemart* are included three individuals of different origin:

1. The product of the bull and the mare.

2. The bull and the female ass.
3. The ass and the cow.

Valmont Bomare adds that, in the valleys of Piémont, the name *bif* is given to the product from the female ass and the bull, and the name *baf* to that between the bull and the mare. In 1780, was seen in Tunis and Algeria a variety of mule called *Kumrah* by the natives, and produced by crossing the ass with the mare.

Such animals have existed in Piémont, Switzerland, Navarre and Dauphiné. The confirmation of this fact is found in the following passage, dating back to 1785: "In the parish of Saint-Tony-de-Vers, in Beaujolois, there is great difficulty in covering the cow with a Navarrin stallion. The cow conceives and gives birth to a product which lives only about a month, and of which but little is known." At this time a native of Gak claims to have seen on a neighboring farm a cow whose mother was a mare, which, during four consecutive years, gave birth to a male or female jumart.

Besides, it can be read in the travels of Méralle that, in the island of Corsica, "there was a pack-animal which was the offspring of the bull and the female ass, and in order to effect the copulation the jenny was covered with a cow's skin in order to attract the bull."

Buffon, who in his time was an authority on natural history, does not believe in the possibility of fecundation between the horse and the cow, at least in our climates. He nevertheless states to have assisted in covering a mare with the bull.

In 1767, two of these animals, one a male, the other a female, obtained from Dauphiné, were received at the Royal Veterinary School of Paris. The female was the product of the bull and the mare, and was not much different from a small mule—a reason perhaps that it was one; nevertheless, the superior jaw was much shorter than the inferior, which is also sometimes seen in old solipeds. The male, the product of the bull and the jenny, was thirty-eight inches high; the forehead indented at the seat of the horns; the general conformation, the bones of the members, the tail and the muffle, resembled those of the bull.

The Lyons Veterinary School possessed at this time a female whose singular appearance merits description:

"It was the product of the bull and the mare, about forty inches high, of a rusty black color, and thirty-seven years of

age. It was strong and robust, but delicate as to feeding, and passed some entire months without drinking; it would defend itself with the feet and the teeth toward those who approached, except toward its master, and during these fits of anger spasmodically eject the urine. It did not possess the bellowing of the bull, the neighing of the horse, nor the braying of the ass, but a shrill cry of a very high pitch which resembled rather the bleating of the goat than the vocal sound emitted by any other animal."

The animal may have been capable of rumination. It had the conformation of the bull, a wide concave forehead, well-formed muffle, and the knees close together. *It was a soliped.* Bourgelat himself made the autopsy, and described the organs by comparing them with those of the bull and the mare. The cranium was more round, the forehead dished and wider, and the nostrils smaller. The orbit was round, while it is oval in the horse; the hard palate wide and concave. This mare had no canines, but there were six incisors in each jaw. The tongue resembled that of the ox; the pharynx was wider than that of the horse. The stomach was identical with that of solipeds, but larger; the uterus was not different from that of the mare; the Fallopian tubes were very dilated, and filled with a whitish liquid, and the ovaries were as large as a bean. Bourgelat concluded that this animal resembled more the mare than the ox.

Adamson believes that these jumarts are fertile among themselves. The general opinion at this time was that they were of no practical utility, because they do not possess in sufficient degree the qualities of either the one or the other ancestor.

How much of the preceding can be accepted to-day as true? Evidently nothing, and the affirmations of our predecessors have left us nothing but a beautiful fable. By analyzing the precited descriptions, one must admit that these so-called jumarts were perhaps nothing more than mules. The bulging forehead is seen in some solipeds, especially in those which are bad-tempered. A single stomach as well as a single hoof are peculiar to the equine species; the same is true of the six incisors in each jaw in the jumart dissected by Bourgelat; it did not neigh nor bellow, but had a

peculiar, shrill cry. The autopsy led one to suppose it to have been a nymphomaniac, and the cry of this animal resembled that of a mare in this condition.

It is therefore admissible to deny the existence of these animals, which really are horses, mules or hinnies, and which have possibly gained some authenticity by malformations, defective conformation and erroneous statements—*Jour. de Méd. Vét. et de Zootech*, May, 1895.

THE MICROBE OF CANINE DISTEMPER.

By Bruno Galli-Valerio.[1]

[Translated by Dr. S. J. J. Harger.]

Among the list of the infectious diseases of animals, which present the greatest interest, not only to the practical veterinarian, but also from a point of view of comparative pathology, we must include the disease of young dogs or canine distemper; *cimurro*, Italian; *hunde-staupe*, German; *dog distemper*, English.

According to some, this disease has been recognized since the most ancient times; according to others, it was imported into Europe since the discovery of the New World.

Its contagious nature was first demonstrated by Renner and Karle[2], Trasbot,[3] Venuta,[4] Krajewski[5] and Laosson.[6] The last observer established at the same time the identity of this disease with that of cats.

It also affects the fox, wolf, hyena, jackal and monkey.[7]

It may be mentioned that in practice canine distemper is frequently confounded with a number of diseases in the dog, but altogether different. For this reason there has resulted a deplorable confusion that, in opposition to the unicistic school

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[1] From the Pathological Institute of the Veterinary School of Milan.
[2] Repert. d. Thier., 1844.
[3] Rec. Vét., 1868.
[4] Med. veterinario, 1873.
[5] Oest. Rev. f. Thierheil, 1881.
[6] Inaug diso. Dorpat, 1882.
[7] Friedberger and Fröhner, 1892.

which teaches that distemper in the dog is only a morbid condition with localization in the skin, the conjunctiva, the respiratory and digestive apparatuses and the central nervous system, has given birth to another school which has differentiated it from different infectious diseases of the dog, and even gone so far as not to give it a place among the canine diseases.

Thus, Professor Pütz[1] considered dog distemper to be only a series of diseases. Schantyr,[2] who recognized distemper, separated it into an abdominal typhus and a typhoid affection. M. Savarese[3] has gone still further. After having said, àpropos of this disease, that in veterinary medicine we are in the habit of generalizing under one nomenclature diverse affections, he expressed himself as follows: *as to the etiology, prophylaxis and pathological anatomy, these generalizations constitute veritable scientific heresies.* If these words of M. Savarese are exact in relation to *fistula of the withers*, etc., they cannot be applied to distemper in the dog. I cannot understand why the fact of regarding canine distemper as a classical morbid entity should be called scientific heresy. That one should frequently be mistaken in applying this name to other and very different diseases I am the first one to recognize, but that this error is sufficient to dispute the special pathology of distemper, I cannot admit.

This would be comparable to denying in human pathology the pathological existence of measles, a very characteristic disease, because of its cutaneous, pulmonary, gastro-enteric and cerebro-spinal manifestations, and to separate it into a series of different diseases, because at times errors in diagnosis have been committed.

Trasbot and other observers have endeavored to establish that this disease is nothing more than one form of variola. In order to refute this opinion, it is only necessary to recall that canine distemper is a disease almost peculiar to young dogs. Out of 1378 dogs affected with distemper in Vienna, two-thirds were less than a year old, one-fifth one to three years, and one-seventh over three years.[4] In my experience, I have observed the disease in dogs from one to three years of age, and believe

[1] "Die Seuchen und Herdekrankheiten," 1882.
[2] Deut. Zeitsch. f. Thiermed., 1891.
[3] Moderno Zooïatro, 1891.
[4] Friedberger and Fröhner.

that when the disease appears later in the animal's life, it is a question of dogs which have not been affected when young or a very rare instance of recidivity. In continuation of the same argument, let us observe the nasal and conjunctival catarrh as well as the none the less important fact that Dupuy was unable to produce immunity in dogs with vaccine.

Some American physicians have assimilated the dog-distemper to scarlatina, and Dr. Peters, of New York, observed a case of contagion to man.[1] That Peters and his colleague have really observed such a case is not for me to deny, but that the disease seen in the dog really was canine distemper can, I believe, be seriously doubted. All who have seen scarlatina and distemper in the dog are convinced that there are marked differences between these two diseases.

Williams[2] has regarded canine distemper and measles as one and the same morbid condition. Without having had any knowledge of his statement, which I regret very much, I have also advanced a similar opinion.[3] There are, in fact, no other two diseases which are as similar as these are.

Distemper affects the young dog; measles attack children and infants. The former is accompanied by malaise, anorexia, fatigue and chills; the latter by malaise, anorexia and chills. In both, there are nasal and conjunctival catarrh, disturbance of the respiratory apparatus, cutaneous eruption, and alterations of the central nervous system.

It may be argued that the eruption of measles is exanthematous whilst that in distemper is pustular; but it may be repeated (1) that in measles the eruption may be pustular; (2) that in distemper it may be exanthematous, of which I have myself observed cases; (3) that the difference in the structure of the skin, as well as modifications in the virus, may explain these variations.

One might also argue that nervous troubles are rare in measles whilst they are almost constant in distemper of the dog. But when they do exist in measles they present the same peculiarities as in dog-distemper, which can be seen in the description of three cases given by M. Gueirolo.[4]

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[1] Gaz. Méd. de Nantes, 1884.
[2] Gaz. Méd de Nantes, 1884.
[3] Moderno Zooïatro, 1893, and Zoonosi, Milan, 1894.
[4] Cronica della clinica medica di Genova, 1892–93.

In spite of all this, I cannot and would not affirm the identity of these two diseased conditions, for the virus, in the dog and in the child, may have submitted to such changes that many experiments must be undertaken before we are able to inoculate the one species from the other.

More recently, MM. Zelinski, Nencki, and Karpinski[1] assert to have observed the transmission of the disease from the dog to man. In the latter it is developed in the form of tenonitis. This observation, which would classify distemper among those diseases transmissible to the human species, renders the study of this disease all the more important.

Distemper in the dog is a very grave disease; its mortality is from 50 to 60 per cent. According to Friedberger and Fröhner it is more prevalent in summer than in winter, but this is explained by the fact, interpreted by Trasbot, that the number of births of puppies is greater in springtime than in the fall.

Until 1875, no investigations had been made as to the specific agent in the etiology of canine distemper. At this time a work published by Semmer appeared.[2]

He claimed that, in a dog which succumbed to distemper, a micrococcus was found in the blood and the lungs, and a short, small bacillus in the blood, the lungs, and especially in the spleen, liver and kidneys. He considered the bacillus the specific agent. In 1881, Friedberger[3] also found the bacillus and micrococcus described by Semmer. Krajewski[4] in the same year observed micrococci in the tissues and the blood.

Laosson, by continuing the researches of Semmer,[5] confirmed the observations of his teacher, cultivated the micrococcus and the bacillus in bouillon from the dog, and with these mixed cultures succeeded in reproducing the disease.

In 1883, Rabe[6] found, in the pustules, the nasal and conjunctival discharges, and in the blood, micrococci isolated or united in diplococci or streptococci, but did not succeed in transmitting the disease. Friedberger[7] confirmed this observation, without, however, admitting the specific action of the microbe.

[1] Gazeta Lekarska, 1894.
[2] Deut. Zeitsch. f. Thiermed, 1875.
[3] Voit. f. Thierärzte, 1881.
[4] Rev. f. Thierheilk. und Thierz, 1881.
[5] Inaug. Diss. Dorpat, 1892.
[6] Woch. f. Thiermed. u. Viehzucht, 1883.
[7] Münchner Jahresber., 1884.

In 1887, Mathias[1] found in the pustules, blood and viscera micrococci, isolated, united in figure of 8's or in streptococci, 1, 2 and 3μ in diameter.

With the material taken from the pustules he fertilized veal bouillon. At the end of fifteen days there developed refracting micrococci, united in twos or threes, and which he regarded as being identical with those of Semmer and other authors.

The lungs have given identical cultures. Animals inoculated with these cultures showed fever pustules, and became innocuous to subsequent inoculations.

In 1888, Marcone and Meloni[2] recognized in the pustules a micrococcus. Cultivated and inoculated, it produced symptoms analogous to those seen in canine distemper; Kitt, however, observed that they occasioned pustules but not distemper.

During the same year Semmer[3] found cocci and small bacilli .0003 to 0015 mm. long, and .00025 mm. in diameter.

In 1890, Legrain and Jacquot[4] observed micrococci, isolated or in chains, mobile, and from .6 to .8μ in diameter, in the cultures made from the serum of the pustules and grown upon gelatin, bouillon and potato. The colonies liquefied the gelatin in funnel-form. Inoculations gave at the point of operation erythematous spots, pustules and immunity.

In 1891, M. Savarese,[5] studying, in the laboratory of M. Riana, an infectious pneumonia of the canine species, which he separates altogether from dog-distemper, found micrococci isolated or united into chains. He cultivated these microbes upon gelatin, potato, etc.; the cultures were characterized by a liquefaction of the gelatin in funnel-form, at the bottom of which were observed thick, flocculent colonies of micrococci, .5 to .7μ in diameter. Inoculations of these cultures produced pneumonia in the dog.

Mallais[6] has made cultures upon gelatin from the nasal mucus. He has found in these cultures a coccus and two kinds of bacilli which (all three microbes) inoculated into a dog, produced distemper. Mallais regarded one of these

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[1] Rec. de Méd. Vet., 1887.
[2] Giornale dell'anatomia e della fisiologia, 1888.
[3] Cited by Schantyr.
[4] Rec. de Méd. Vét., 1890.
[5] Moderno Zooïatro. 1891.
[6] Cited by Schantyr.

bacilli as specific ; he inoculated it with positive results in three cases, and cultures heated to 60° C. were capable of conferring immunity.

In 1891 Schantyr[1] in a very interesting work carefully reviewed the subject and arrived at the conclusion that the micrococci heretofore described were only pyogenic micrococci. From his opinion, he distinguished : (1) a disease of young dogs determined by a small bacillus 1 to 2μ in length, grouped, found in the spleen, blood, the liquid exudates and liquefying gelatin ; their cultures upon serum transmitted the disease ; (2) an abdominal typhus caused by a bacillus .7 to 2.0μ long which did not stain with Gram's method ; (3) a typhoid affection due to a bacillus shorter than the preceding, which does not stain with the above method.

More recently Zielinski, Nencki and Karpinski[2] have published a very interesting work which may be cited somewhat *in extenso* because it has not yet been translated from its native language. In 1892 Zielinski was called to see a man who was taken the preceding evening with chills, headache and pain of the eyeball. The eyelids were swollen, there was a serous infiltration around the cornea, a slight protrusion of the eye which was immovable because the movements were painful, fever and a general depression ; in short, all the symptoms of tenonitis, an inflammation of the capsule of Tenon. The following day his sister as well as a schoolmate who had remained at the house of her father became sick. A microscopical examination of the conjunctival exudate revealed isolated and grouped micrococci which stained with anilin and with the method of Gram and grew very readily upon gelatin and bouillon.

The disease immediately affected another schoolmate, another sister and the mother. A lady who was stopping with the family was also affected and communicated the disease to her father and to a small puppy.

Some time afterward a man sleeping in the bed of the first case became sick with the disease and on examination the same microbes were found in the discharge from the eyes. In some of these patients the disease was complicated with diffuse bronchitis and pneumonia.

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[1] Deut. Zeitsch f. Thiermed, 1891.

[2] Gazeta Lekarska, 1894.

The conditions of things remained thus until Zielinski was informed that a young pet dog around the house was taken sick with symptoms of tenonitis and it was then recalled that the mother of this dog had also suffered from the disease the preceding year. An examination of the young dogs by Zielinski revealed swollen eyelids, lachrymation, nasal discharge, eruption in the groin and the axilla, clonic spasms of the extremities and cries of pain; there was also vomiting and diarrhea. Cultures made from the discharge from the nose and eyes gave micrococci identical with those which were found in the sick persons.

The micrococcus observed both in the persons and in the dog is immobile and measures 8μ. It can be grown upon bouillon at 37° C. and upon gelatin. It is analogous to the strep. pyogen. albus, but it decomposes sugar and peptonized albumen. Cultures inoculated into the conjunctival sac of the dog produced symptoms of distemper and tenonitis. The authors draw the conclusion that tenonitis of man may at times only be a symptom of dog distemper in the human species.

Since 1893, upon the suggestion of M. Riana, who has found short bacilli in a section of the lung of a dog which had died from distemper, I have occupied myself with the bacteriological study of this disease. Of all the dogs which I have examined for this purpose some were less than a year old and none were over three years.

The anatomo-pathological lesions which I have always met in these animals are the following: catarrh and hyperemia of the conjunctiva and the nasal mucous membrane, exanthema of the inguinal region, foci of broncho-pneumonia in the lungs and at times hepatization. Small, whitish spots with a characteristic penetrating odor were disseminated over the surface of the lungs. In a single case, I have observed ulceration of the pulmonary pleura, which Savarese has always met in the pneumonia described by him. As to the digestive apparatus, there was catarrhal inflammation of the gastric and intestinal mucous membrane. The central nervous system showed very marked lesions; hyperemia and marked edema of the brain or the spinal cord and small hemorrhagic spots.

A microscopical examination of the scrapings of the surface of the lungs revealed that the whitish points spoken of above

are formed by epithelial cells with alveoli of fatty degeneration. Coloration with anilin dyes and with the method of Gram renders the ovoid bacilli visible, which are isolated or placed side by side and vary in length from 1.25 to 2.5μ and .31μ in width.

In the scrapings of a section of the central nervous system and in the exudate from the meninges identical bacilli were observed.

Section of the lungs shows the lesions of a broncho-pneumonia. The vessels are filled with blood, and the acini are here and there filled with exudate in which the same ovoid, grouped bacilli are seen.

Sections of the spinal cord show the lesions of meningo-myelitis which I have described in a preceding work. The bacilli which I have described are in some specimens found around the centres of inflammatory infiltration, but they are not very frequently seen there.

I have never met these microbes in the blood and the internal organs. I have made cultures from the blood, lungs, brain, spinal cord and the exudate of the meninges. The cultures made from the blood alone did not grow, all the others, on the contrary, have always given very characteristic cultures which did not differ from one another.

The following are the characteristics:

(*a*) In gelatin at 18° to 20° C. a few bubbles of gas are formed along the course of the puncture on the second day, at the same time, a white spot, like a small particle of bee's wax, appears on the surface of the gelatin. This white point spreads out into a patch, white and shiny like wax. Then this patch becomes hollow in its centre, cup like, and penetrates deeper and deeper into the gelatin, without liquefying the latter, until it has a funnel-shaped form.

(*b*) Upon gelatin at 30 to 48° C. the cultures *en stries* develop in the form of whitish, shining areas with festooned borders, or in the form of small foci of a waxy aspect and more or less coalescing.

An examination of all the cultures demonstrates the presence of the ovoid bacilli of which I have spoken. At times there are some which appear united end to end by a small link of protoplasm feebly stained. Sometimes this particle of protoplasm, almost colorless, appears elongated and presents at its

two extremities small ovoid bacilli. Again very rare forms of bacilli may be seen. The prominent shape is the ovoid ; frequently they are arranged side by side.

With these cultures, diluted with sterilized water, I have made a series of inoculations upon dogs. With a Pravaz syringe 1 c. c. was injected either under the skin, into the saphena vein, or into the lungs.

First Observation.—I injected one syringeful of the diluted culture into both saphena veins of a dog seven years old. The animal died two days afterward, and at the autopsy, hyperemia and hemorrhage of the intestines, edema and hyperemia of the brain were observed. The ovoid bacillus of distemper was found in the spleen, liver and brain. Cultures were reproduced.

Second Observation.—An inoculation of the culture under the skin was made in a dog eight years old. The animal only showed a little stiffness. No lesion was found after death, some days afterward.

Third Observation.—Dog eight years old, inoculated into the saphena vein with the culture. The subject only showed some stiffness and made a complete recovery.

Fourth Observation.—Dog seven years old and inoculated like the preceding. Slight stiffness with complete recovery.

Fifth Observation.—With a culture from the lungs, I inoculated into the saphena vein a bitch and a dog five and six years old respectively. The bitch died five days afterward with a temperature of 40° C. At the autopsy, pulmonary congestion, edema and hyperemia of the brain and of the spinal cord. A microscopic examination revealed the ordinary ovoid bacillus which developed in the usual culture media.

The dog presented a temperature varying from 39.5° to 40°, slight co-ordination in the movement of the posterior members ; but the recovery was rapid.

Sixth Observation.—On the first of February, I inoculated a bitch four or five years old, into the right lung, and her puppy, five to six months old, into the fold of the groin with a culture obtained from a dog which had died from distemper, using one-half of a syringeful on each side.

The puppy had a temperature of from 39.5° to 40°. February 12, it presented on the internal face of the left thigh a red fluctuating tumefaction, with two pustules, one of which

was much more developed than the other. Incised with the bistoury, this vesicle discharged a fluid, greenish-gray pus, with an odor analogous to that of the lungs in dogs which succumb to distemper; the pus contained a large number of ovoid bacilli, having the character of those which I have described. A culture upon gelatin made with this material showed the ordinary characteristics.

The puppy continued to emaciate and on February 19 it manifested the following symptoms:

The muscular movements were without co-ordination. The animal supported himself on the legs which were rigid and the entire body oscillated up and down. It took a few steps with the hind extremities swinging to and fro, and then fell on the ground with epileptiform convulsions; the eyes were discharging, the respirations stertorous and the puppy continually emitted pitiful cries; the coat was staring and the temperature 39.5°. The patient died during the night of February 20. The following post-mortem lesions were observed: Catarrh and hyperemia of the conjunctiva; on the internal face of the right thigh an abscess as large as a walnut, filled with a fluid pus which had the same characters as that of the previous case. The lungs were hepatized with whitish puncta, a fatty degeneration of the epithelial cells of the alveoli; blood fluid and black; catarrh of the digestive canal; very marked hyperemia of the dura mater of the cerebrum; hyperemia and edema of the brain; hyperemia aud hydropsy of the spinal meninges; edema and hyperemia of the spinal cord.

The ovoid bacillus was found in the abscess, the lungs and the central nerve substance. The cultures also showed the usual characteristics. The microbe was found in sections of the lungs and the central nerve tissue, but they were not very numerous.

An analysis of all these experiments demonstrates that in a single case the inoculation of the culture of the bacillus which I have always found in dogs succumbing to distemper, has produced all the symptoms of this disease; and very justly this was the only case in which we had the right to expect such a result. In this case, in fact, the subject was a very young dog which had not been affected with distemper previously, while in all the other cases it is a question of older animals which had probably been affected with distemper before.

If I compare my researches on this question with those of the observers who have preceded me, I find that no one had before discovered the microbe of distemper in the central nervous system, precisely the place where it can be found in its condition of greatest individual purity. I believe that it is difficult to obtain the cultures in a state of absolute purity by simply examining the serum of the pustules, the nasal and conjunctival mucus, and even the tissues of the lungs.

If I have not deceived myself, I have been the first one to produce with cultures all the symptoms of distemper, and especially the characteristic cerebro-spinal symptoms.

Conclusions.

1. In distemper, there is found in the lungs and in the central nervous system a bacillus whose dimensions vary from 1.25 to 2.5μ in length and .31μ in diameter.

2. This microbe gives characteristic cultures in gelatin at 18° to 20° C.

3. The inoculation of these cultures into the veins, under the skin and into the lungs of aged dogs does not reproduce the symptoms of distemper.

4. The inoculation of a culture obtained from the brain, under the skin of a dog five to six months old, has reproduced the disease, with its characteristic pulmonary and cerebro-spinal symptoms.—*Jour. de Méd. Vét.*, May, 1895.

A NEW THERAPEUTIC AGENT: BARIUM CHLORIDE.

By Prof. W. Dieckerhoff.

[Translated and Abstracted by Leonard Pearson]

In numbers 23, 24 and 27 of the *Berliner Thierärztliche Wochenschrift*, Professor Dieckerhoff describes the action of barium chloride on horses, cattle and sheep. Until the experiments of Professor Dieckerhoff were made, nothing was known of the physiological action of barium chloride, and it was never

employed even empirically by veterinarians. The results of this recent study are so astonishing and promising that the following copious extracts are made from the above mentioned articles.

The first experiment was performed on a horse, and was described in No. 23 of the *Berliner Thierärztliche Wochenschrift*, as follows: "A healthy eighteen-year-old carriage horse was given 2.0 grams of barium chloride at intervals of two and three days and no effect was noted. Two days after the last dose, 15.0 grams were dissolved in the drinking water, and forty-five minutes after it had been taken by the animal, light colicky symptoms appeared. One hour after the administration of the medicine the bowels moved freely, and in the course of the next hour four more movements resulted. The pulse and respiration were not affected. Other discharges of feces followed, some of which were watery and some comparatively firm. It was evident from the composition of the feces that it came from the small intestine. Ten hours after the ingestion of the medicine, the horse commenced to eat and the next day was perfectly well. Ten days later, the same experiment was repeated on the same horse, and within thirty minutes after the administration, and at intervals of from four to ten minutes, feces and intestinal gases were discharged. This action continued for two hours.

Two other horses, one a twelve-year-old work horse which had been overfed on Indian corn, and was suffering from severe colic with tympany, and the other, a twenty-year-old horse suffering from colic as a result of over-feeding on Indian corn and peas, were each given 10.0 grams of barium chloride, dissolved in a quart of water. In fifteen minutes each had passed large amounts of intestinal gases, and in a few minutes before a half-hour had elapsed, excrement was discharged in profuse quantities, and passages followed each other in quick succession for three-quarters of an hour. While defecating, both horses evinced considerable pain, which was traced to the intense contraction of the muscles of the intestine caused by the barium chloride. Both horses recovered.

Another horse, that had suffered from chronic colic for four weeks, and whose life had been despaired of, received 15.0 grams of barium chloride and soon began to discharge large amounts of feces, at intervals of about five minutes, for two

and one-half hours. The next morning, the horse was apparently well, but a few days thereafter he again developed colic, and died of rupture of the cecum.

The first mentioned experimental horse was, at another time, given 2.0 grams of barium chloride dissolved in distilled water in the jugular vein. Scarcely five minutes after the injection, feces were voided. The passages were repeated at short intervals for about two and one-half hours, and considerable amounts of water were expelled from the rectum. The peristaltic sounds were so intensified that they could be heard at a distance of several steps from the horse. During this period the animal continued to eat hay and frequently looked around at his flank, but, aside from this, did not indicate the existence of abdominal pain, although there was some evidence of general weakness. On another occasion, the same horse was given subcutaneously, 3.0 grams of barium chloride dissolved in 10.0 grams of distilled water. This occasioned considerable restlessness, pain at the point of injection and loud peristaltic sounds, but the laxative effect was not so prominent as in the preceding instances.

Heifer.—A two-year-old, healthy and well-nourished heifer was given a number of doses of barium chloride up to 40.0 grams without action. 3.0 grams were dissolved in 10.0 grams of distilled water and were injected into the right jugular vein, but no decided action followed, although during three hours after the injection the animal voided considerable amounts of natural and also rather soft feces.

Sheep.—A two-year-old healthy ram was given a dose of 2.0 and 4.0 grams of barium chloride without effect. After a dose of 6.0 grams the animal seemed to remain perfectly well, and lively and continued to eat its food. Movements of the bowels were not effected. The next morning the animal was depressed, refused his food, staggered in his walk and became rapidly weaker to such an extent that it was soon unable to stand. The muscles of the extremities were completely paralyzed, but consciousness was unimpaired. Later in the day, the animal died, without showing the least indication of diarrhea. The post-mortem examination revealed edema of the lungs, slight cloudiness of the heart muscles, numerous small hemorrhagic spots on the mucous membrane of the small intestine, and stagnation of blood in the vessels of the small

and large intestine. Similar symptoms and lesions were found in a lamb four months old, which was given, per os, 6.0 grams of barium chloride, dissolved in 200 grams of distilled water.

These experiments show that in horses, sufficient doses of barium chloride caused powerful stimulation of the muscles of the intestine; that sheep do not react to the substance until a considerable time has elapsed, and that toxic doses cause paralysis of the spinal cord. Cattle possess great powers of resistance toward this substance. Therefore barium chloride cannot be of much therapeutic value in treating diseases of the two last mentioned species, but is useful for the horse in all of the diseases in which the rapid and complete emptying of the intestines is desired. With the exception of colic, however, this indication can be met with less heroic remedies, but in colic, so far as can be determined, and especially in cases of overfeeding of horses with grains that are difficult of digestion or with damaged straw, barium chloride seems to be of value.

In No. 24 of the *Berliner Thierärztliche Wochenschrift*, is cited a case, in which two horses were accidentally poisoned. It so happened that in April of this year, a quantity of barium chloride in sacks was transported by wagon from a railroad station in Berlin. One of the sacks was defective and some of the salt escaped to the floor of the wagon. A few hours afterward a brewery wagon, to which a pair of horses was attached, stopped behind the above mentioned wagon, and as the door was open, it was possible for the brewery horses to lick up some of the barium chloride that still remained on the floor. From one-half to one hour thereafter, one of the brewery horses, which was a large brown Belgian gelding, six years old, showed symptoms of severe colic and died in one hour. The other horse, a black Belgian gelding, ten years old, also developed symptoms of colic and severe diarrhea. The animal died about fourteen hours after the ingestion of the poison. Before death he exhibited profuse and continuous diarrhea, active peristalsis, accelerated pulse, profound general weakness, and later, inability to stand. The post-mortem examination showed redness and swelling of the stomach, and an empty intestinal canal, which was also inflamed. No alterations worth noting were found in the spleen, liver, kidneys or lungs. The heart was dilated and filled with a soft, very

dark clot. The mucous membrane of the pharynx was red. Chemical examination of the contents of the stomach revealed the presence of a large amount of barium chloride.

In No. 27 of the *Berliner Thierärztliche Wochenschrift* further experiments with barium chloride are recorded, and these are so novel and seem to be of such great practical importance that the article is translated in full.

"The action of barium chloride in horses has already been described in the first article (No. 23), and attention was then called to the fact that in large doses the substance not only causes strong contraction of the intestines, but that it is also a powerful poison to the spinal cord, and that, therefore, great care must be exercised in selecting the proper dose. It was also remarked that the action on the intestines of the horse might well be employed therapeutically.

"The continued experiments have shown, as the preceding ones indicated; that barium chloride causes to a greater extent than any other remedy, not excepting eserin, a contraction of the entire intestinal tract. Quite recently it has been used on a number of horses suffering with colic, and the favorable results seem to be of considerable importance in veterinary practice. Barium chloride works most rapidly when an aqueous solution is injected into a vein. However, it can also be administered as a drench or in an electuary or bolus. It is not advisable to inject a barium chloride solution beneath the skin, because it is not so active when given in this way, is decidedly irritant, causes great pain, and when the solution is concentrated (1 to 5), the skin may be destroyed. When properly graduated doses are administered by way of the stomach or intravenously, the only result is an active stimulation of the motor apparatus of the intestinal tract with profuse discharge of intestinal contents; irritation of the gastro-intestinal mucous membrane does not occur. In this respect, barium chloride resembles eserin, and it is well known that aloes, calomel and other drastics not only cause increased peristalsis but also irritate the intestinal mucous membrane directly. In this action of barium chloride, we find an explanation of the fact that after the remedy ceases to operate in horses there are no resulting symptoms of irritation of the stomach and intestines, such as poor appetite, rapid pulse, discoloration of the membranes and cerebral depression.

"That action of barium chloride on the heart, which is described in toxicological literature, in reference to small experimental animals, does not appear in horses. The experimenter has often noticed that the use of this substance is not followed by more rapid pulse, but on the contrary, when it is administered to horses excited with colic the pulse frequence is somewhat reduced. The result of the intravenous injection indicates that barium chloride acts directly on the motor ganglia of the intestines and by their stimulation more or less active contraction of the intestinal muscles is produced.

"Experimental inquiry into the action of small and large doses seems to show that the small doses cause only a weak contraction of the intestines with very slight increase of the peristaltic sounds, while large doses cause a tetantic contraction of the intestines accompanied by acute pain (colic). In the latter case, only the rectum is emptied at first, and not until the intestinal tetanus relaxes can the contents of the anterior portions of the intestinal tract be voided. That the large doses cause a painful contraction of the intestines is shown by the tenesmus and more or less prominent symptoms of colic. This action is in proportion to the dose. The time required for emptying the intestines after the introduction of the medicine into the stomach depends upon the individual, upon the quantity of medicine and the form in which it is administered. If the medicine is given in solution as a drench, purgation commences in from fifteen to forty-five minutes. When a bolus or electuary is the vehicle employed, diarrhea does not begin before an hour and a half or two hours. Large doses operate more quickly than small ones. When a solution of barium chloride is injected into the jugular vein the action commences at once; in a few seconds the horse draws up his upper lip and makes chewing movements with his tongue, which is probably due to a peculiar sensation in the pharynx. If the horse suffers from pharyngeal catarrh, there is a more or less profuse discharge of saliva and mucus, principally from the nose. Sometimes, when unsuccessful attempts are made to swallow this material, the animal coughs. The head is sometimes moved back and forth on account of the unpleasant prickling sensation in the pharynx. When the animal is not suffering from catarrh and also in cases of colic, this action on the salivary glands is not noticed. The contents of the posterior

portion of the rectum are usually voided within the first minute after the intravenous injection of the drug. If the rectum is empty feces are not voided for from three to five minutes.

"Evacuations continue to occur at intervals of from a very few minutes to twenty minutes, and last for from two to six hours, provided the dose is of the right size. In cases of tympanites, intestinal gases are driven off with remarkable rapidity, so that the abdomen is soon reduced to its natural size. As a rule, the contents of the rectum are voided in balls, after which the contents of the colon and cecum are voided as a soft mass or as a fluid and, finally, the thin or fluid contents of the small intestine are expelled. In severe colic, resulting from overfeeding, the abnormal fermentation of the expelled material is frequently evidenced by a sour, offensive odor. Medium doses, which may be sufficient to cure colic due to indigestion, do not interfere with the appetite for food and water. Large doses cause loss of appetite which lasts for from two to six hours. The loss of appetite is probably due to pain in the intestines and to an unpleasant taste in the mouth and throat.

In treating colic with barium chloride, it is very important to select the appropriate dose. While too small doses have no effect, too large doses may cause a dangerous or even fatal paralysis of the spinal cord. In determining the appropriate dose it is necessary to consider the size and weight of the animal, also its age and condition of nutrition. In giving barium chloride by the stomach, the dose is measured by the gram, while in giving it in the jugular vein, it is measured by the decigram. Old and emaciated horses sometimes react violently from doses that are lightly born by strong, well nourished horses, and this must be considered in treating cases.

"When the colic is due to an incurable condition of the intestines such as displacement, incarceration, twists, plugging by hard, dry contents, etc, it is evident that barium chloride can be of no more value in opening a passage than any other medicine. It is of value to know, however, that in conditions of this kind the urgency of the symptoms is increased by a full dose of this drug because the pain of active peristalsis is added to that which existed before. Hence, when this remedy is used the owner of the horse should be told of its possible effect."

As to repeating a dose of barium chloride in a case of colic, it has not yet been possible to formulate a rule. Professor Dieckerhoff is, however, of the opinion that in all cases in which a full dose does not cause a sufficient peristaltic movement of the intestinal tract with discharge of intestinal contents within from six to eight hours, the disease—unless it can be treated surgically—is incurable. Since the drug in large doses has a toxic influence on the spinal cord and may in this case cause death, it is not advisable in the light of present knowledge to give a second dose until twelve hours have elapsed. The use of barium chloride in indigestion colic will usually, especially when the animal is seen early enough—that is, before the development of an incurable closure of the intestines—make the employment of all other remedies superfluous, but it does not preclude their use.

Professor Dieckerhoff does not intend to advocate the use of barium chloride in all cases in preference to eserin, and expressly states that the claims he made for the latter substance when he first recommended it to veterinarians in 1882 as a remedy for colic, have been sustained. Eserin has the advantage of being less irritant to the skin than barium chloride and it can be administered subcutaneously, but barium chloride is more prompt and sure as a peristaltic stimulant than eserin. Barium chloride also has the advantage of being a stable compound, and in its powdered form will keep indefinitely. It is not known whether the solution, when kept in well corked bottles, will deteriorate or not. The cost of barium chloride is very low. It must always be remembered that the drug is a powerful poison and it should be handled accordingly.

The following points in reference to the administration and doses of this substance are of value:

A. Administration of Barium Chloride by way of the Stomach.—(*a*) In aqueous solution. When horses suffer from indigestion colic, they usually lie down a great deal, and it is easy then to hold them and administer a drench. For this purpose barium chloride can be dissolved in either distilled or ordinary water. As a general principle, attendants should not be allowed to administer drenches to horses on account of the danger attending this operation. When used in this way the dose is from six to ten grams. In exceptional cases, or for a very large horse, as much as twelve grams may be administered,

while for ponies from three to five grams are sufficient. A dose is dissolved in a wine bottle full of water and given at one time. (*b*) In pills, bolus or electuary. It is not permissible to mix barium chloride with sulphates, for by so doing the insoluble and inactive barium sulphate is formed. It can, however be mixed with sodium chloride. In this form the dose for horses is from 6.0 to 12.0 grams, and it should be noted that a dose of 6.0 grams has no action on a large horse, while 12.0 grams may kill a small or emaciated one. The following prescription is recommended:

℞

Barii chloridi pulv. . . . . 10.0 g.
Sodii chloridi pulv. . . . . 100.0 g.
Rad. altheæ pulv. . . . . 40.0 g.
Aq. dest. q. s. ad massam boli.

This bolus may be administered to a horse of medium size and, of course, care should be exercised to see that all of it is swallowed.

B. Intravenous Injection of a Solution of Barium Chloride.— In injecting barium chloride into the vein it is important to insert the needle fully into the vein so that the solution will be discharged safely into the blood current and not into the connective tissue, where it might cause severe local irritation. No evil effects have as yet resulted from this injection, and even concentrated solutions do not cause irritation of the vein or clotting of the blood. This method of administration is to be recommended whenever it is possible to carry it out properly. If there exists an incurable closure of the intestines the pain will be considerably increased by this treatment. In other cases, however, the result is most excellent.

The dose for intravenous injection is from 0.5 to 1.25 grams. Large horses do not react after the injection of a solution containing 0.5 grams or, at most, the effect is slight. The maximum dose (1.25) is too large for a small horse. For ponies, 0.3 to 0.4 is enough. For heavy draught horses it is sometimes necessary to administer 1.5 to 2.0 grams, but Dieckerhoff is of the opinion that 1.25 grams should be the maximum dose in all but exceptional cases. Even if 2.0 grams is not dangerous for large horses, it is at all events, painful, and for this reason the dose should be no larger than is absolutely necessary for the accomplishment of the desired result. 0.75 grams has in some

cases been sufficient in treating colic of small draught horses.

After the injection of barium chloride it is advisable to walk the horse for half-an-hour, because this seems to lessen the pain. The animal should then be placed in a box stall and be allowed to move about or lie down at will.

Experiments.

1. A seven-year-old mare, of a large coach breed, was given the bolus for which the prescription is printed above. In two hours, the diarrheal discharges commenced, and continued for five hours. The composition of the excrement showed that the diarrhea was due to increased peristalsis and that the mucous membrane was not inflamed. During the period of activity of the drug the mare continued to eat grass and hay, and the general condition was undisturbed.

2. A bolus containing 12.0 grams of barium chloride was given to a large eight-year-old draft horse that was suffering with chronic founder in the front feet. In one and one-half hours diarrhea commenced. The discharges were repeated ten times in six hours and were in part very soft. Other abnormal conditions were absent, the pulse, temperature and respiration were unaffected.

3. Brown gelding, eight years old, large draught breed; had suffered from colic eight hours and was on this account brought to the hospital of the Berlin Veterinary School. He was given an intravenous injection of 1.25 grams barium chloride dissolved in ten grams of water. Immediately the upper lip was drawn up and chewing movement commenced. In fifteen minutes feces were voided and passages continued for some time at intervals of four to seven minutes. In two hours the horse was well and ready to eat.

4. A twelve-year-old gray draft horse had suffered from colic two days. The treatment he had received from a veterinarian had been without result. When the horse was brought to the clinic he exhibited symptoms of colic of medium intensity and total loss of appetite for food and water, no peristaltic sounds could be heard. 1.2 grams of barium chloride dissolved in ten grams of water was injected into the vein and the usual symptoms came on at once. In three minutes after the injection the horse voided feces and the evacuations were

repeated frequently. In two hours the horse was easy and was ready to eat and drink, and in two hours more no sign of colic could be discovered.

5. A twelve-year-old brown gelding was brought to the clinic with colic. Pulse 36, respiration 40, temperature 38.1, conjunctiva red, peristaltic sounds absent. Treatment: Barium chloride 1.0 grams in six grams of water, injected into the vein. The first passage occurred in five minutes and was followed by six others in ten minutes. The horse showed the usual symptoms and at times the abdominal pain seemed to be increased. The third hour after the injection it took food and water, and in another hour was declared cured.

6. Heavy work horse, brown gelding, eight years old, was brought to the clinic on account of a colic of twelve hours' duration. Pulse 56, respiration 20, peristaltic sounds absent. Treatment: Intravenous injection of 1.5 grams of barium chloride in 10.0 grams of distilled water. In three minutes intestinal gases passed off and at short intervals, for the next forty-five minutes, excrement and gases were voided alternately. The horse then became quiet, lay down in the stall and in another hour commenced to eat and was perfectly well.

7. Small draft horse, weight 860 pounds, fifteen years old, had suffered from colic several hours following a feed of Indian corn. The abdomen was somewhat distended, the animal would look about frequently and would lie down and roll, peristaltic sounds absent, pulse 36, respiration 20, temperature 37.8. Treatment: Intravenous injection of barium chloride .80 gram, in 6.0 grams of water. In one minute feces were voided; in twenty-two minutes the feces became soft and fluid; the rectum was tightly contracted; evacuations continued one and one-half hours, and in three hours the horse was well.

8. Black mare, small carriage breed, eight years old, suffered with colic with great tympanites, pulse 50, respiration 20, great uneasiness and frequent lying down and rolling. Treatment: Intravenous injection of barium chloride, 1.0 grams in 5.0 grams of water. The usual symptoms developed at once, and intestinal gases were immediately expelled. During the first half-hour large quantities of gas and excrement were voided and the abdomen became small. The symptoms of colic, however, continued. Later, foamy mucus was voided under much pressure. The horse was then placed in the stable,

whereupon it lay down frequently and turned on its back. Peristalsis was active. A displacement of the folded colon was suspected, but on account of the intense contraction of the rectum, the examination was not satisfactory. In six hours after treatment commenced, the horse became quiet, and large quantities of feces were voided. After this the animal drank a bucket of water and was perfectly well.

9. An eight-year-old, poorly nourished gray mare, weight 830 pounds, was brought to the clinic suffering from colic of several days' duration. There was some distension of the abdomen and no peristaltic sounds could be heard. Colicky pains were intense. Treatment: Intravenous injection of 1.0 gram barium chloride in 10.0 grams distilled water. In two minutes feces were voided, and in fifteen minutes five passages occurred. Later, there were some tenesmus and evacuations of fluid feces. Two hours after the injection the animal showed some weakness and lay down quietly on its side. It could not be forced to stand, but in six hours it stood up and evacuated a large amount of thin excrement. It at once evinced a very good appetite and shortly thereafter it was returned to its owner cured.

10. A ten-year-old gray gelding, weight 780 pounds, had suffered from colic two days before it was brought to the clinic. Feeble peristaltic sounds could be heard over the small intestine but not over the large intestine, pulse 48, respiration 28, temperature 38.7, pain severe. Treatment: barium chloride 1.2 grams, dissolved in 10.0 grams of water, and injected into the vein. The horse was then walked; the upper lip and tail were at once raised and feces were voided. In five minutes the straining became greater and feces were voided at very short intervals. The horse was then placed in the stall and he lay down quietly. An hour later, he voided large amounts of thin excrement, and following this, light colicky symptoms reappeared. The horse then became quite weak, especially in its front legs. Four hours after the administration of the medicine the horse lay down quietly on its side with its legs stretched out, and, even when forced and assisted, would not stand. The grass that was lying in front of him was eaten greedily. After lying a few hours in this position, he got up without assistance and the next morning was entirely well.

11. *Incurable Cases.*—Brown mare, eighteen years old, in poor condition, was brought to the clinic one forenoon about eleven o'clock. Pulse 60, respiration 20, considerable abdominal pain, peristaltic sounds very slight. Treatment: Intravenous injection of barium chloride 1.0 gram, dissolved in 8.0 grams of water. Immediately the pain became more intense, the horse humped its back and was with much difficulty prevented from lying down. It was walked. There was much tenesmus and at short intervals, for about an hour, considerable quantities of feces were expelled, which were part semi-solid and part watery. The pain, however, did not lessen. The horse lay down in the stall continuously and struggled occasionally. Six hours after the injection, it was lying flat on its side and was unable to rise. It was given good care but became constantly weaker, and in the evening the pulse became very rapid. Death occurred the next morning. Post-mortem examination revealed a strangulation of the ileum by the stem of a lipoma growing from the mesentery.

12. Heavy work horse, brown gelding, suffered with colic twenty hours before it was brought to the clinic. Treatment: Intravenous injection of barium chloride 1.5 grams, dissolved in 10.0 grams of water. Immediately after the injection the horse made chewing movements with the tongue, as though it would remove an unpleasant object from the roof of its mouth. Both the upper lip and the tail were raised, and shortly after pressure upon the rectum commenced and balls of feces were voided. Occasionally, a number of brief, light peristaltic sounds could be heard. The pressure continued but no more feces were voided. A displacement of the large intestine was suspected, and this condition was recognized by examination through the rectum. It was impossible to feel the pelvic flexure of the colon and it was assumed that this had been displaced before the horse was brought to the clinic. In five hours the horse died without having voided feces in appreciable quantity, and the post-mortem examination verified the diagnosis made during life.

ANIMAL DIPHTHERIA.

By Dr. Léon Gallez.

[Translated by Dr. S. J. J. Harger.]

[Continued.]

II. *Diphtheria in Chickens.*—Diphtheria in chickens, according to the opinion of Löffler, is different from that in pigeons, and is caused in the former by a distinct bacillus. This experimenter did not succeed in producing in chickens a general intoxication by inoculating them with pure cultures of the bacillus which he has discovered in the false membranes taken from pigeons. As to the symptomatology, he gives, beside, the following differential characteristics :

In pigeons, it is principally the base of the tongue and the mucous membrane of the pharynx and the commissures of the beak which present the lesions, while in the chicken the diphtheritic alterations are seen especially upon the palate, the nasal mucous membrane and the conjunctiva.

The false membrane in the latter animal lies in direct contact with the connective tissue in such a manner that it is detached with difficulty, and when torn away leaves a raw, bleeding surface. In the chicken, on the contrary, the pseudo-membrane can be removed with ease and without leaving any ulcerated surface.

This fact, says Léniez,[1] proves that Löffler has compared the false membranes in pigeons with those of chickens at different stages of the disease, and that the false membrane in the former has been examined a long time after their formation.

Löffler also remarks that intestinal catarrh is often observed simultaneously with diphtheria in the pigeon, a phenomenon also observed by Léniez in chickens. According to Löffler, finally, the recovery from the disease is more common in pigeons than in chickens; this fact is not absolutely demonstrated.

Again, the only absolute distinction that can be made between diphtheria in pigeons and that in chickens must rest upon the

[1] Léniez, "La tuberculo-diphtérie des oiseaux," (Mémoire de la Société linnéenne du nord de la France. t vi. 1884-85.)

fact that the bacillus of the two diseases is different, admitting that the bacillus described by Löffler is the specific agent in diphtheria of the pigeon. But has the specific nature of this bacillus been well established? Inoculations with such cultures have reproduced false membranes, but it must be admitted that micrococci, streptococci, etc., have also caused the formation of similar lesions without being specific in the etiology of diphtheria.

Emmerich, Loir and DuCloux have also dicovered microbes which, to them, were susceptible of producing alterations similar to diphtheria. The bacteriological studies which have been made of the bacillus or bacilli of the disease in pigeons have evidently not been conclusive. Whichever it may be, diphtheria in pigeons shows alterations similar to those found in the chicken, which tends to lead one to infer the identity of the pathogenic agents in the two diseases.

Mosselman who has furnished me with much bibliographical information on the veterinary part of this paper believes that until it is proved to the contrary we must admit that one and the same microbe is the pathogenic agent of avian diphtheria which selects in preference sometimes chickens, sometimes pigeons, etc., according to the greater or less resistance offered by the different species and also the greater or less virulence of the virus due to successive transmissions through animals of the same species. In our country, the learned professor adds, the pigeon is an excellent subject for the disease in consequence of the defective conditions under which it is hatched and reared.

This opinion is corroborated by the researches of Loir and Ducloux who have observed an epidemic of diphtheria among chickens at the beginning of 1893 at Béja (Tunis). These authors have studied the agents of this disease and have been able to find, in all cases which they examined, a microbe to which they have attributed a specific rôle; they have succeeded in attenuating its virulence by exposure to heat and have produced in chickens an immunity against the disease. All poultry were susceptible to the disease, and chickens, ducks, pigeons, turkeys, etc., irrespective of age, became diseased from the inoculation of the virulent matter or the cultures of the microbe. The latter is inoculable to rabbits which succumb in several days if the dose is sufficiently large; they

may be inoculated under the skin, into the trachea, the digestive tract, the peritoneum and the veins, the intra-venous inoculation is the preferable method. The guinea-pig as well as animals of the bovine species are immune. The bacillus which Loir and Ducloux have isolated is found in very large numbers, in the liver, spleen, kidneys, blood, the false membranes and the mucous covering the air passages.

Inoculations of chickens and pheasants cause the symptoms of diphtheria; cultures made from the microbes found in the organs of animals inoculated produce a bacillus identical with that found in the tissues of subjects affected with spontaneous diphtheria, pigeons react in the same manner to the inoculation as chickens and pheasants do.

This bacillus is mobile and round at its extremities; it grows very well upon gelatin where it forms a narrow cream-colored streak; upon gélose at the ordinary temperature about 39° C. the culture is less visible and is greyish-white; upon potatoes it grows very rapidly at the ordinary temperature and forms an abundant yellowish-white culture.

The microbe multiplies very rapidly in bouillon at 35° to 40°, and makes the liquid cloudy; at the end of a few days the superior part of the culture becomes clear whilst in the inferior part there is a whitish, viscid sediment adhering to the sides of the glass. A stab-culture in gelatin forms a faint, white streak not very visible. It grows also upon sterilized egg albumen and in the aqueous humor of the eye of the ox; also with or without the presence of oxygen; it can be easily stained by the ordinary methods, but not with that of Gram; it loses its virulence after exposure to a temperature of 60° C. for five minutes; it resists the effects of dessication. This is therefore the bacillus which according to Loir and Ducloux is the specific agent of diphtheria of birds; it is equally virulent to the chicken, pigeon, duck, turkey, etc. As can be readily observed, if this microbe appears to differ essentially from the bacillus of human diphtheria, it presents characteristics almost identical with those of the bacillus of the diphtheria in pigeons described by Löffler; it is distinguished from the latter only in that it is not stained by Gram's method, and in that it is fatal to the chicken inoculated with it, a result which is not obtained, as we have seen, with an inoculation of the microbe of Löffler; like the latter and unlike the bacillus found in diphtheria of

man, it causes little or no reaction in the guinea-pig. By exposure to a temperature of 55° for thirty minutes it can be attenuated so as to become innocuous to chickens in which, when inoculated under these conditions, it acts as a veritable vaccine virus. Struck by the frequency of pseudo-membranous angina in persons who have been in contact with barnyard fowl affected with diphtheria, Loir and Ducloux have endeavored to demonstrate if the avian bacillus could be the cause of contamination, and if it were possible to find the latter in the diphtheritic exudate in man. These authors have made a bacteriological examination of six persons with the following results:

First Case.—Benign; caused by streptococci.

Second Case.—Malignant; tracheotomy; caused by streptococci.

Third Case.—Caused by bacillus different from that of human diphtheria as well as from that of avian diphtheria.

Fourth Case.—Caused by staphylococcus.

Fifth Case.—Caused by the bacillus of Klebs-Löffler.

Sixth Case.—A child seven years of age living near Tunis on a farm where avian diphtheria had existed for six months presented symptoms of malignant diphtheria with the false membranes slightly adherent in which was found, by making cultures, a bacillus having all the characteristics of that of diphtheria of birds. Inoculated under the skin of the chicken, it caused the death of this animal in five days, and after the autopsy the lesions, the microscopical examination of the tissues and cultures upon gelatin and potato revealed conditions identical with those found in diphtheria of birds.

Loir and Ducloux, as we have said, succeeded in producing in birds immunity against avian diphtheria by inoculations of the attenuated cultures of the bacillus which they have isolated from the diphtheritic products in these animals. Achille Sclavo, an Italian experimenter, published a very interesting note in which he presented the results of experiments made by him to develop in chickens immunity against human diphtheria. This author has been able to prove that the immunising substance is transmitted through the egg. The following is a résumé of his communication[1]:

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[1] Sclavo. "Della immunizzazione de polli contra il baci lo difterico di Klebs-Löffler e del passagio della sostauze immunizzenti nello uovo."—Giornale della Reale Academia di Medicina di Lorino, Vol. XLII anno LVII, No. 9-10.

"It is necessary," says Sclavo, "to select chickens not too young, 600 to 700 grams in weight, and to keep them in the best hygienic conditions concerning alimentations and the surroundings. I have secured the most satisfactory results by first injecting under the skin of these animals a virus attenuated either by exposure to a high temperature or by the addition of trichloride of iodine and by inoculating subsequently increasing quantities of cultures of the diphtheritic bacillus. These animals can also be rendered innocuous against the diphtheritic virus by injecting them from time to time with the filtered culture and later with active cultures not filtered; however, it is more difficult to obtain the immunity with the second method, and it is necessary to observe greater precautions. Having thus immunized some subjects, I have been able to prove that the immunizing substances formed in the blood are contained in the egg. In order to illustrate this point, I injected a portion of the contents of an egg, diluted with an equal part of sterilized water, under the skin of chicks and subsequently inoculated them with the minimum fatal dose of the culture of the diphtheritic bacillus; no effects were noted. The immunizing substances are found in the yolk as well as in the white of the egg."

III. *Diphtheria in the Calf.*—Among the list of other animals subject to diphtheritic disease in which bacteriology has revealed a microbic agent, we must include the calf and the rabbit.

Dammann and Löffler have made a special bacteriological study of diphtheria in the calf. Dammann[1] has called attention to the false membranes in which he has found micrococci and bacilli; the former he considered as specific. Rabbits inoculated with them have succumbed in a day and showed hemorrhagic infiltration at the seat of inoculation.

Löffler[2], on the contrary, attributed the specific action to the bacilli which are found in the false membranes in the form of long indulated filaments disposed in thick clusters.

The disease is transmissible to sheep, rabbits and mice. The calf is very readily susceptible, while in the aged bovine infection is the exception. The virus has a great

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[1] Gedoelst. Loc. cit. Dammann, Deutsche Zeitschrift für Thiermed., 1877.
[2] Löffler. "Mittheilungen aus dem kaiserl. Gesundheitsamt," 1884.

deal of vitality, and Dammann has found it active in a stable nine months afterward.[1]

The milk has also been suspected of conveying the disease, but it has not been proved whether it derived its infectious properties from the animal which furnished it, or whether it has been contaminated after milking. During three epidemics of diphtheria in persons in England in 1878, 1886 and 1888, investigation seemed to point toward an infection of the milk when drawn from the udder, a conclusion which future experience alone will warrant. In order to make this point clear, Klein[2] has inoculated under the skin of two healthy cows 1 c. c. of a bouillon culture of the bacillus of human diphtheria. The local symptoms were a slight fever followed by a small swelling at the point of inoculation. One of the cows appeared to suffer considerably on the twelfth day and died on the fourteenth; the other became very sick and was destroyed thirty-five days after the inoculation. In both, in from six to ten days, an eruption appeared upon the mammæ and the teats, which commenced as papules and finally terminated in vesicles and pustules. The lymph from the vesicles and pustules inoculated into two calves produced symptoms similar to those in the cows which furnished the virus. In these two cows the bacillus of diphtheria was found in all the tissues as well as in the remains of the local swelling at the seat of inoculation; the bacillus was also found in the milk at the commencement of the eruption on the udder, but at a later period it could not be seen in this secretion.

These experiments corroborate the opinion which attributes to the milk of such cows an infectious nature, an opinion which is so much more important if one supposes the similarity of the true diphtheria with a disease in the cow, ordinarily benign, and accompanied by false membranes in the throat.

Abbott[3] has studied this question by means of experiments similar to those of Klein. He has never found the diphtheritic bacillus in the milk. His experiments therefore diminish the apprehensions indicated by the investigations of Klein, who subsequently demonstrated that the passage of the bacillus into the milk is not constant; the variance of his results with those

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[1] Gedoelst. Loc. cit.—Dammann. Deutsche Zeitschrift für Thiermedic, 1877.

[2] Klein. "Etiologie de la diphtheria." 19th Annual Report, etc., 1889-90,

[3] Abbott. *Journal of Pathology*, Vol. II, p. 35,

of Abbott[1] thus disappears. They are in accord, however, in that the Klebs-Löffler bacillus can cause the death of milk-cows, and is found after death in the tissues. That the bacillus, existing in the system, may pass into the milk is possible. Abbott admits the possibility of this fact, for, with Griskey, he has seen this same diphtheria bacillus, inoculated under the skin of guinea-pigs, pass into the lymph system of the peritoneum, conveyed there, without doubt, by the white blood corpuscles. A bacillus can thus be conveyed by the leukocytes into any tissue.[2]

There is therefore great danger of contamination. Klein cites two cases in which the milk from a dairy was suspected to be infected with the diphtheritic virus, and on the teats of the udders of these cows were found papules and ulcers identical with those found upon the mammæ of the cows inoculated with the bacillus of human diphtheria.

From these observations, it could therefore be established that the diphtheria of cows may be transmissible to man, and as to its etiology may be identical with human diphtheria. It is logical then to suppose that diphtheria in calves is quite distinct from that of cows. It appears to me rational to admit that they are one and the same disease presenting some differences, such as it does when affecting animals belonging to different species. We will again refer to this question.

IV. *Diphtheria in Rabbits.*—In the organs of rabbits which have succumbed to the diphtheria of a so-called spontaneous origin and localized upon the intestines, Ribbert[3] has found bacilli measuring from 3 to 4μ in length and 1 to 4μ in width, with round extremities and joined by their ends in chains of two or more, so as to form thread-like filaments. These micro-organisms grow very rapidly and can be cultivated best at a temperature of 37 to 38° C. upon gelatin, agar, potato, etc. Deprived of oxygen their growth is slow. On gelatin plates they appear like small transparent colonies, at first gray but afterward assuming a brown tint; their surface is granular and of a nacrous aspect. Stab-cultures in gelatin develop but feebly and the gelatin is not liquefied. Upon potatoes, it forms a whitish, thin layer which spreads slowly.

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1 Twentieth Annual Report, 1892.

2 *Annales de l' Institut Pasteur*, 1893, p. 794, and 1894, p. 349.

3 Ribbert, *Deutsche medicinische Wochenschrift*, 1887, No. 8.

These bacilli are stained very readily by an aqueous solution of fuchsin. They can also be colored with the method of Gram.

Inoculations of the cultures into the auricular vein of the rabbit causes the death of the animal in three days; numerous colonies of the microbe are found in the capillaries of the liver and spleen. Hypodermic inoculation produces inflammation of the lymphatic glands. Introduced into the buccal cavity the bacillus determines inflammation of the mucous membrane of the small intestine with patches of necrosis, an observation which leads one to infer that the natural mode of infection is through the food.

V. *Diphtheria in Cats.*—Klein, through his experiments, has called attention to such a disease affecting cats, which may be caused by infection from diphtheria in man. These animals, according to Klein, may be contaminated by persons and subsequently propagate the disease to others.

Conclusions.—What *conclusion* can be deducted from this résumé, which is as complete as it is possible for me to present it, of the bacteriological studies of animal diphtheria? Do they exclude the possibility of its transmission to man?

The diphtheria of *pigeons* is without doubt determined by a bacillus whose morphological and bacteriological properties differentiate it from that of diphtheria in man; however, the certainty of this is not absolute and the characters of this microbe, unlike that of Klebs, are not as specific and as well understood as to force a conviction. I do not know of any experimenter up to the present time who has inoculated himself with the virulent culture of the bacillus of the diphtheria of pigeons.

Diphtheria of *pheasants*, *chickens*, and other barnyard animals has been produced by a bacillus almost identical with that which Löffler has discovered in the false membrane of the pigeon. He has also found *this* bacillus in an infant suffering from pseudo-membranous angina.

As to diphtheria in the *calf*, opinions are still more at variance. Is it Dammann or is it Löffler who is right? Or, again, is the disease caused by the same microbe as that found in cows? According to the facts observed in these animals and interpreted by Klein, it would seem that it is a question of a disease analogous to the diphtheria in persons and to whom the affection is transmissible.

Whatever it may be, if there is any uncertainty on the subject of the nature of the specific properties of the pathogenic agents of spontaneous diphtheria in the different animal species; or, if the proof of the specific action of the different bacilli found in the pseudo-membranous products in the animals is not complete, one fact still remains: that the Klebs-Löffler bacillus, *such as it is, found in the false membrane in man* has not yet been discovered in similar products accompanying the spontaneous diphtheria in animals. Even if it has not been found there under the latter conditions, does it follow that it may not be discovered there, if not with the characters that it possesses in man, at least in a modified form, in view of the different medium which it inhabits. Cannot the various bacilli discovered in the diphtheritic products of animals be considered as the bacillus of Klebs, whose different conditions of living has modified the biological and morphological characters?

Beside, even in man, the microbes present themselves sometimes in the form of straight filaments, sometimes under that of curved threads; sometimes their extremities are round, sometimes the ends are club-shaped; their dimensions are subject to variation. The bacilli of the cultures are smaller than those found in the false membranes and in some cases they refuse to stain.

Do not the works of Chorrin[1] upon the biological and morphological transformation of microbes according to the condition of the medium militate against the absolute opinion of those who advocate the non-identity of human and animal diphtheria? Would it be erroneous to suppose that the bacillus of the diphtheria of the pigeon, chicken, calf, loses its characters, which it assumes in these animals, through the fact of its passage and sojourn in the organism of man where, although preserving its pathogenic action, it presents a different morphology?

"The invariableness of the characters," says Macé[2] "is nevertheless not absolute. It is necessary to consider the conditions of living under penalty of separating two things which are identical.

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[1] Chorrin; "Sur les variations morphologiques des microbes," Comptes Rendus de l' Académie des Sciences. December 5, 1887.

[2] Macé. "Traité Pratique de bacteriologie," second edition, 1892, p. 248.

Under the influence of changes in the medium," adds this author, "or from the effects of certain physical agents, a species which normally consists of rod-like elements of perfectly fixed and constant dimensions may be transformed into elements that are spherical or nearly so, and which may be taken for *micrococci.* Another may form straight or irregularly curved long filaments which may simulate filamentous or spiral bacteria. There is, however, one condition which enables us to interpret properly such supposed changes in microbes; it consists in their return to their typical, primitive form when they are replaced into the conditions of living which to them are considered as being normal."

Not being familiar with such bacteriological studies, I will refrain from drawing conclusions from these facts; but from the previous statements which I have made, it will be remembered that from the observations made in reference to the false membranes of diphtheria, Dammann attributed the disease to a *micrococcus* while Löffler believed the cause to be the long, undulating and isolated filaments found in the exudate. Are these distinct forms of the bacillus of Klebs-Löffler? Does not the observation of the transmission of diphtheria from the cow to man incline toward the verification of this hypothesis?

What are we to think also of the *pseudo-diphtheria* in infants in which the pathogenic agent is only a micrococcus? Is it not admitted that the latter can produce a disease identical with that which is caused by the diphtheria bacillus? The only differential character between these two affections consists in a difference in the microbes.

The same pathogenic agent can, in the different animal species, produce reactions, that is to say, dissimilar diseases; and reciprocally, diseases identical in appearance may be due to different causative agents. "Numerous experimental facts," says Roger,[1] "have shown that the properties of microbes are not absolutely fixed; their characters may vary according to the medium in which they are developed; often by passing through an organism their form and functions are so changed that it is difficult to determine their identity."

Is bacteriology then sufficiently accurate to deny with certainty the identity of animal and human diphtheria, under

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[1] Roger, "Traité de médecine de Charcot," Bouchard, et Brissand, vol. 1, p. 522.

the pretence that these two diseases are associated with different microbes?

What are we to think finally of the bacillus of avian diphtheria, isolated by Loir and Ducloux, and which these authors have found in the false membrane of an infant seriously affected with angina?

Guignard and Charrin[1] have obtained, with the bacterium of "blue pus," very interesting modifications in form. This peculiarity, if existing under different forms, has been considered by many observers as being a normal condition and placed in first rank among the specific characters advanced by the partisans of *polymorphism* or *pleomorphism* of bacteria. With them, the number of species of this group is much greater than is generally believed; there exists in nature a number of forms quite limited and specifically distinct, that can be so changed as to assume as series of secondary forms dependent upon the medium in which they exist. It is thus that a species which in certain conditions consists of spherical elements, and is thus classed among the micrococci, can by altered conditions of growth appear as rods or straight or spiral filaments. Each species presents in some manner a cycle of evolution more or less complete, with forms more or less numerous through which it successively passes according to the nature of the conditions. (Macé.)

This theory, I must admit, is not universally recognized; if it has many adherents, it has many opponents. Where shall we seek for the truth?

It is not alone diphtheria to which are applicable considerations of this kind.

Pneumonia, as we know, is frequently observed in animals, and in particular, in the horse. Schütz has found in the diseased foci and in the exudate into the plural cavity, oval and capsulated bacteria, often disposed in twos or in chains. These microbes by their form resemble the pneumococcus of Talamon-Frænkel; but they differ from the latter by some characters; they develop in a temperature of 17°, whilst the pneumococcus only commences to grow at a temperature of 24°, and gives the best cultures at 36°. They are pathogenic in the mouse,

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[1] Guignard et Charrin, "*Comptes rendus del Académie des Sciences de Paris,*" Dec. 5, 1887.

rabbit and guinea pig, while the microbe of pneumonia in man is innocuous upon this latter animal. Here are, therefore, two microbes possessing different characters and producing the same lesions "according to the importance which may attach to their differential characters, says Roger[1], one may verify in these two microbes either two different species or two varieties of the same species."

Perroncito has quite recently isolated in the horse affected with *typhoid fever* a bacillus, an inoculation of which has reproduced a typhoid disease in the horse and in the sheep. This bacillus differs from that which is found in the human being in that its cultures upon gelatin are thicker and whiter, and in that it develops more readily upon potato.

According to Roger, it cannot be actually decided if this microbe is identical with that of man; there is always the same difficulty of interpretation. Which ever it may be, the microbes cause the same disease.

Nevertheless, I cannot omit to suggest this strange tendency of bacteriology to differentiate absolutely microbes which give identical reactions upon the animal or the human organism, and which determine the same alterations, by relying simply upon their action on gelatin or potato. Why not rather depend upon the analogy of their action upon living beings in order to establish their identity or non-identity?

In the presence of the relative uncertainty which still surrounds the specific agents of animal diphtheria, cannot one ask if bacteriology is accurate in establishing the non-identity of the diphtheria of animals with that of man? Does this branch of science furnish arguments so well demonstrated that it errs in differentiating two diseases so similar from a point of view of their symtomatology, as I propose to demonstrate presently, and in completely ignoring, or at least incorrectly interpreting so large a number of observations as have proved the transmissions of the diphtheria of animals to man!

No one doubts this reciprocal relation, that is to say, the transmission of human diphtheria to animals, since it is already admitted that an animal thus contaminated can in turn communicate the disease to man. The accord ceases to exist when

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[1] Loc. cit., p. 519.

it is a question to establish if spontaneous diphtheria of animals is contagious to man.

But what is the so-called spontaneous diphtheria? Does it differ in reference to its symptoms from the diphtheria acquired by contact with diphtheritic persons? No; it is simply a difference in the bacillus. Who is able to raise the veil that hides from us the primitive source from which the disease entered the world? Have animals first been affected by the disease and then contaminated man, or is it rather the latter who have affected animals. In either case the bacillus by the fact of its passage from animal to man, or from man to animal and by the fact therefore of a change of medium and different conditions under which it lives and proliferates, must submit in its new habitat to modifications more or less pronounced, and finally it is altered into a definite type other than the original, and different from what it would have been had it continued to live in the same organism? But which was first infected by this microbe? Was it the animal or was it man?

This is a question which I do not pretend to solve and which appears to me as obscure as the origin of the chicken; was the first chicken born from the egg or was the first egg laid by the chicken?

Is it nevertheless inadmissible that spontaneous diphtheria of animals found its primitive cause in contagion obtained from man and that it was perpetuated in this species with the characters appropriate to the organism on which it was first developed? Beside has no one ever endeavored to determine clearly the diverse elements which give rise to what is called epizoötic of diphtheria? Perhaps minute inquiries would reveal that the contamination was through the false membranes of human diphtheria. I have cited several examples which should admit the possibility of this fact. Chickens by puddling in cesspools may ingest the germ of the disease from this source, for it is only here, so to speak, that the products of excretion, expectoration, etc., of families accumulate, and since there are few communities that are not visited from time to time by diphtheria; and besides, as the pathogenic agent possesses extreme tenacity, this source of contamination can be accepted.

This will explain the frequent coincidence of epizoötics and epidemics of diphtheria so frequently observed.

If a flock of chickens contaminated in this manner comes in contact with others, the latter are not tardy in becoming infected, avian diphtheria being extremely contagious; if the disease exist in a flock of chickens or other fowl, the proprietor can, by retailing them upon the market, spread the disease into numerous places. In such conditions, avian diphtheria constitutes a great source of danger to man, because it is only a human diphtheria transmitted to the animal, and bacteriologists admit that the latter may convey the contagion to the human species; it is nothing more than human diphtheria re-infecting man through the intervention of an animal.

It is, therefore, possible, in my opinion, to harmonize the results which bacteriology has given, by viewing the question as I have endeavored to interpret it.

One could perhaps still better conciliate the data furnished by observation with that of experimentation by admitting that, as in man, bacteriological researches have demonstrated the existence of two forms of diphtheria: a *true diphtheria*, determined by the bacillus of Klebs-Löffler; the other, *false*, caused by other micro-organisms, but in both the symptoms being identical. Likewise there exists in animals two diphtheritic diseases, each being distinct from the other only by its etiology: the one *accidental*, due to the bacillus of Klebs-Löffler, contracted in the manner indicated above and transmissible to man; the other, the diphtheria *peculiar to animals*, the *true diphtheria*, has for its cause a bacillus with characteristics different from the preceding, and *probably not contagious* to man, or at least if it is contagious, as the facts added by Loir and Ducloux seems to prove, it only produces in man a form of *pseudo-diphtheria*.

Going a step further with these hypothetical conclusions, can we now consider the two varieties of animal diphtheria, the *accidental* and the *true*, as one and the same disease, by admitting that the true form has for its primitive origin an *accidental* contamination from man, the contamination having caused the development of the disease, which by its repetition in individuals of the same species, may have assumed special characters from the fact that the agent of infection, on account of a change in the medium and in conditions of its existence, has become modified in its morphology and biological properties in order to accommodate itself to the new organism in

which it must live? We can explain in this manner the contradictory results obtained by Emmerich and by Löffler in their bacteriological studies of the diphtheria of the pigeon, the one having examined pigeons affected with *accidental diphtheria* (that is to say, contaminated by man), and the other, pigeons affected with *habitual diphtheria*. This would also explain that the latter form is less contagious, which appears to follow from the observations of Mégnin and Strauss.

Such a possibility is even suggested by some authors convinced of the non-identity of the two affections, but which was deduced from convictions but little founded. In "Traité des Maladies contagieuses des Animaux," by Galtier,[1] the following sentence can be read: "It should be admitted that, although diphtheria in animals may not be positively transmissible to man, precautions should be taken with a view of preventing all contaminations of persons and to avoid the contact of the virulent matter with excoriated surfaces, as well as their ingestion and inhalation."

Besides, the fear of contamination to which a person in contact with chickens and henneries invaded with diphtheria is exposed, is more and more believed in by many, and especially since the importation of Italian poultry. "The introduction of Italian chickens has produced the most disastrous results," says Baron de L'Épine,[2] president of the Agriculture Committee of Bievre; "the small chickens are subject to a disease known under the name diphtheria, a disease all the more dangerous because it can be communicated to man, especially to infants."

Mode of Contagiousness from Animal to Man.

What is the mode of the transmission of diphtheria from animal to man or from man to animal?

A striking fact is that it is not in the large cities that diphtheria is so frequent. It is especially in the outskirts of cities, in suburbs and in the rural districts that cases of diphtheria are the most prevalent and the epidemics more severe.[3] All know the prevalence of infectious diseases in large cities and towns;

[1] Vol. 2, page 818.

[2] L'Épine. L'Agranome, 3 février, 1895, No. 5.

[3] Barbier. "De l'importance des fumiers et des oiseaux de basse-cour dans l'etiologie de la diphthèrie."—*Gazette Médical de Paris*, 1889, No. 4, p. 37.

why, then, this predilection of diphtheria for the country? "Because," says Barbier,[1] "on the one hand, the manure and the refuse from cesspools and street-cleaning are transported to the country and, on the other, because barnyards are so close to the houses and because of the dissemination of the disease by the animals affected with the disease."

Klebs, at the congress of Zurich, in 1883, already made the remark that diphtheria develops frequently after hauling manure and garbage from cities to villages, and principally upon the course followed by the vehicles which transport this refuse.

The rôle of manure and garbage in the propagation of diphtheria has been especially pointed out by Professor J. Leisier, of Lyons. Longuet has also advanced, as corroborative evidence of this opinion, a direct, but accurate proof, by demonstrating at the Congress of Hygiene, in Vienna, that, in the principal European armies, the prevalence and mortality was constantly greater among the cavalry than among the infantry, or, in a more general manner, among those whose quarters were infected with manure than in those with reverse conditions. Recent researches made in the German army confirm this observation. General inquiries made as to the origin of epidemics of diphtheria have very constantly recalled the presence of depositories of manure, stables and cow-sheds in the neighborhood of the diphtheritic centre.[2] This is therefore a point which should draw the attention of those to whom the public health is entrusted, without losing sight of the fact that manure is only an intermediary carrier, a habitat of the pathogenic germs, and a careful examination of the animals in the stable and of the poultry should be made.

There are evidently other fomites in the transmission of the diphtheritic virus, but the above seems to be the most important, and it is very often in the country that children are stricken with diphtheria after playing with the hens and chickens that revel in the manure pile. Besides, it is quite a common sight in the rural districts to see chickens, pigeons, etc., cared for in the fire-place or in the room, where they are in contact with the family and fondled by the children. In

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[1] Idem. Ibid.

[2] Longuet. "Les origines de la diphthérie."—*La Semaine Médicale*, 1892, p. 446.

this manner, the specific agent can be effectively and widely disseminated and entire families become affected; in many cases, careful inquiries made have revealed such circumstances as the only apparent cause for the existence of an epidemic of diphtheria.

It would be pertinent that a careful bacteriological investigation should be made in all such cases suspected to be of animal origin. It could thus be determined whether or not we deal here with *pseudo-diphtheria.—Annales de Méd. Vét.*, July, 1895.

EDITORIALS.

THE UNITED STATES VETERINARY MEDICAL ASSOCIATION AT DES MOINES.

The next meeting of the United States Veterinary Medical Association will be held in Des Moines, Ia., in September. A comprehensive and valuable program has been arranged, and the Western veterinarians are making extensive preparations to make the meeting successful and pleasant. The attendance from the East will probably be very large, and it is likely that the many important questions that will be discussed will receive both profuse and prolific treatment.

ASSOCIATION OF VETERINARY FACULTIES OF NORTH AMERICA.

This body, which now represents nearly all the veterinary schools of the United States and Canada, will convene during the first two evenings of the meeting of the United States Veterinary Medical Association in Des Moines, Iowa. As is well known, this voluntary association of veterinary schools was brought about wholly through the wise and persistent efforts of the Committee on Veterinary Education of the United States Veterinary Medical Association, for the purpose of advancing the standard of veterinary education in every way that might be acceptable to the schools represented. We expect much of this association of faculties, but we know that the advance will be made slowly, step by step, with toil and trial. There are grave differences to amicably adjust, serious obstacles to surmount, illusions to dispel. Happily, all are agreed that our requirements for graduation are too easy of attainment, and are sincere and earnest in joining for an advance movement. Now that the march has begun, keep the ranks solid, and move slowly and cautiously. The strong must support the weak, the swift encourage and be patient with the slow ;

otherwise, the association will fall apart, not to be reconstructed. Let the East study the conditions that obtain in the West, and vice versa, and both be friendly, frank, unselfish, willing to make a sacrifice, to put forth an extra effort. With unanimity, magnanimity, courage, hope and trust this Association of Veterinary Faculties may ultimately accomplish grand results. May we not expect within a very few years to see every veterinary school in the United States and Canada requiring a common minimum entrance qualification, giving a practically uniform course of instruction covering, at least, three terms of six months each (exclusive of holidays and time devoted to examination), attracting better and more young men and graduating better equipped students?

These schools are builders. To produce a noble edifice the builder must cull out the poor material, and exercise all his skill upon the selected material. If the superstructure is to be high, the foundation must be broad and deep. The entrance examination should, therefore, exclude the worthless, and finally come to attract better educated and more refined students. The two-years' course will lengthen to three, the six months session will become seven, then eight and, finally, we shall see a few schools giving a post-graduate course of one year. With more time the student may train rather than stuff, may assimilate facts, learn the uses of his five senses, learn to interrogate himself, to reason and to know what he knows.

By the stuffing process, inevitable in the short-term school, the student comes to be a mere unreasoning repository of symptoms and doses, with cerebral indigestion and constipation of thought. Give him more time; let him ruminate. Let him dissect more, use the microscope oftener, work longer in the laboratory, lean less heavily upon his instructors, but find out more for himself. Until such a stage shall have been reached by our veterinary schools, the veterinary profession will continue to struggle in vain for the social, municipal and State recognition which is accorded the medical profession. Has the Association of Veterinary Faculties the courage of its convictions? We believe that it has, and we call upon the alumni of these schools to give them encouragement and support.

The following subjects will be discussed:

1. "Results of Prescribed Entrance Examination." By Dr. Junius H. Wattles, of Kansas City Veterinary College.

2. "State Boards of Veterinary Medical Examiners and Their Relations to Veterinary Colleges." By Dr. Henry Detmers, of Ohio State University, Columbus.

3. "Uniform Course of Instruction in Schools Belonging to the Association of Veterinary Faculties." By Dr. Jno. W. Adams, Veterinary Department, University of Pennsylvania, Philadelphia, Pa.

4. "Mutual Recognition of Students of Colleges Belonging to the Association." By Dr. H. Gill, New York Veterinary College.

5. "Uniform Veterinary Degree." By Dr. Chas. McEachran, of Montreal Veterinary College, and Dr. Olof Schwarzkopf, of McKillip Veterinary College, Chicago.

6. "Competitive Examinations for Positions in Veterinary Colleges." By Dr. A. Liautard, American Veterinary College, New York City.

7. "College Fees."

ABSTRACTS.

RECURRENCE OF TETANUS.

Blanchard relates an instance which may be interesting from a point of view of the duration of immunity against tetanus. A horse which had recovered from tetanus suffered from a second attack of this disease four years afterward.—*Soc. centrale*, May, 1895.

OINTMENT FOR BURNS (HOAS).

Aristol	5.0–10.0
Ol. Oliv.	20.0
Vaselin	
Lanolin, aa	40.0

Dissolve the aristol in the olive oil, and then mix with the vaselin and and lanolin.—*Ibid.*

ANTISEPTIC POWDER AS A SUBSTITUTE FOR IODOFORM (A. PICK).

Hydrarg. Bichl.	0.012–0.02
Acid. Boric.	30.0
Acid. Tannic.	0.6
Lactose	q. s. fiat 60 grams.

First mix the bichloride and the sugar of milk well, and then add the boric and tannic acid.—*Journ. de Méd. Vét.*, June, 1895.

EMPLOYMENT OF CREOLIN IN MANGE OF CHICKENS.

Schaeffer has treated hens which had lost their feathers in consequence of an invasion by the *sarcoptes lævis* and *mutans* by douching them twice a week with creolin water, and thoroughly cleaning the hen-house and the surroundings with the same solution. The disease is promptly checked, and completely disappears in four months.—*Annuaire Therap. de Bass*, 1894.

ANOTHER MILK EPIDEMIC.

An epidemic of typhoid fever is reported at New Milford, Conn. There have been already twenty-three cases, and the disease is ascertained to have its source in milk obtained from a certain farm. A farm laborer who had come from another town, and was either suffering from a mild form of typhoid, or was in its early stages, was employed to do the milking on the farm in question, which furnished the milk supply of a private school, and of all the families in which the disease has so far appeared.

A rather forcible argument for the sanitary inspection of dairy farms! the *Boston Medical and Surgical Journal* thinks.

OINTMENT FOR RINGWORM (PIROGOFF).

Sulph. Sub.	15.0
Pot. Carb.	4.0
Pic. Liq. } Tr. Iodi, aa }	50.0
Axunge	100.0

The diseased parts are shaved before making the application. In twenty-four hours the soft crust is picked off, the skin washed with soap and water, and a second application made. This is continued until the epidermis freely desquamates; subsequently the ointment of salicylate of zinc is employed. A cure follows in from two to three weeks.—*Ibid.*

ANTICANCEROUS SERUM.

Emmerich and Schall (*Deutsche Medicinische Wochenschrift*, No. 17) inject serum taken from the blood of a sheep. The animal, having been previously inoculated with the erysipelatous streptococcus, is bled, and the blood thus obtained, when passed through a Chamberland filter, is ready for use.

The dose varies from one-half to twenty-five cubic centimetres, given every day or every other day, depending upon the size of the tumor and the reaction that occurs. The usual dose, however, varies from one-half to four cubic centimetres, and causes no pain. When larger quantities are injected, pain may continue for a few hours.

Fever following an injection is rare, and it never goes very high, even after very large amounts are employed.

Locally, the reaction is spoken of as a pseudo-erysipelas, which disappears in from twenty-four to forty-eight hours. Seven cases were treated by the authors, and the results were satisfactory, though time enough has not elapsed to say if the cure is complete or permanent.

Sero-therapy for the cure of cancer finds its best indication in the recurring tumor following the employment of the knife. —*La Tribune Médicale*, May 22, 1895.

A NEW METHOD OF GENERAL NARCOSIS.

Rosenberg (*Deutsche Medicinische Wochenschrift*, No. 50, 1894) described a new method of inducing general narcosis. Before commencing the anesthetic, the patient's nasal mucous membrane is to be sprayed with a 10-per-cent solution of cocain. During prolonged anesthesia the spraying is to be repeated every thirty minutes, and again at the end of the operation, no matter how short. His conclusions are:

1. Excluding cases of negligence and of poisoning, cardiac syncope in narcosis is, in so far as it can be attributed to the chloroform, reflex.

2. The syncope and the accompanying respiratory embarrassment are due to irritation of the peripheral trigeminal filaments in the nasal mucous membrane.

3. Every anesthetic inhaled produces the same reflex symptoms as chloroform.

4. By proper cocainization of the nasal mucous membrane all such reflexes can be positively prevented.

5. Thus a greater part of the dangers of inhalation anesthesia, particularly of chloroform, can be removed.

6. Cocain possesses a certain action antidotal or antitoxic to chloroform, and thus further reduces the dangers of chloroform.

7. Chloroform in such cases is to be preferred to ether, as being less dangerous. The chloroform must always be administered drop by drop.—*University Medical Magazine*, June, 1895.

PROCEEDINGS OF SOCIETIES.

NEW HAMPSHIRE VETERINARY MEDICAL ASSOCIATION.

A special meeting took place on June 13, at the Eagle Hotel, Concord. Dr. Lilice's name was voted upon favorably to membership.

A paper was read by Dr. Pope on "The Diagnosis of Tuberculosis." A discussion followed and the meeting adjourned until the first Tuesday in October.

L. POPE, JR.,
Secretary.

SCHUYLKILL VALLEY VETERINARY MEDICAL ASSOCIATION.

The annual meeting of the Schuylkill Valley Veterinary Medical Association was held at Dr. Fegely's office, Northwestern Hotel, Pottsville, Pa., June 20th, at 1 o'clock p. m. with the President, Dr. Burkholder, in the chair.

After calling the meeting to order, Dr. Sallade, in the absence of Dr. Frederici, the Recording Secretary, was appointed Secretary. Matters relating to elevate the profession were the main topics of discussion, and higher education of those who go to the University of Pennsylvania to study was asked.

President Burkholder stated that in accordance with the annual meeting officers had to be elected.

The old officers, with the exception of Dr. J. W. Sallade, who retired as Corresponding Secretary, were re-elected as follows: President, S. B. Burkholder, of Denver, Lancaster county; Vice-President, W. H. Moyer, of Elizabethville, Dauphin county; Recording Secretary, U. G. Frederici, of Tamaqua Corresponding Secretary, O. G. Noack, of Reading; Treasurer, F. H. McCarthy, of Ashland; Trustees, O. G. Noack, of Reading; Eli Snyder, of Orwigsburg T. C. Faughman, of Shamokin.

Dr. N. K. Fegely, of Pottsville, a graduate of the National Veterinary College, of Washington, D. C., and Dr. J. B. Hagenbuch, of Mahanoy City, a graduate of the University of Pennsylvania, were elected to membership.

A paper on "Meat and Milk Inspection," showing the urgency of employing veterinarians as inspectors, was read by Dr. Noack. Dr. Sallade read a paper on "Stable Hygiene."

The motion was carried to hold the next meeting at Pottsville, September 18, 1895. The meeting then adjourned.

O. G. NOACK,
Corresponding Secretary.

CALIFORNIA STATE VETERINARY MEDICAL ASSOCIATION.

STOCKTON, Cal., June 12, 1895.

On the above date a meeting of the California State Veterinary Medical Association was held at the Commercial Hotel, Stockton, Cal.

The meeting was called to order by the president, Dr. C. B. Orvis, at 2.30 p. m.

Upon roll call the following members responded: Drs. Orvis, Eddy, Fox, Spencer, Sr., Lemke, Williams, Hogarty and Archibald. Visitor, Dr. Eddy, Sr.

Letters of regret were read from absent members.

The minutes of the previous meeting were read and approved.

The Board of Examiners reported favorably on the application of C. L. Megowan, whereupon on motion C. L. Megowan was unanimously elected to membership.

Under the head of unfinished business, the election of a delegate to the next meeting of the national organization was taken up with the result that Dr. R. A. Archibald was unanimously elected to represent the association at the next meeting of said organization.

Owing to the fact that Dr. Archibald was elected a delegate, he refused to collect the assessment levied at last meeting for the purpose of defraying the delegate's expenses.

Dr. D. F. Fox was appointed to collect the assessment.

Under the head of reading of papers, etc., and discussions, Dr. Lemke was called upon to entertain the meeting, which he did by giving a review of the work he was doing toward the prophylactic treatment of anthrax in the central portion of the State under the direction of the Pasteur Anthrax Vaccine Company. He stated that the above-named company had employed him for the purpose of determining to what extent anthrax prevailed in California, with a view of commencing warfare on the disease by means of vaccination. He said he desired the co-operation of every practitioner in the State, more especially the members of the association. He further stated that he had investigated the disease to a considerable extent and had about come to the conclusion that there was a difference between the disease and true anthrax; the mortality was not so great. He wished to get an expression from the members present, who had had some experience with the disease, as to their opinion of the nature of the disease. He was unwilling to vaccinate until he was thoroughly convinced of its true nature. He requested the members to prepare specimens of animals that had died from the disease and forward them to him, so he could have them submitted to a microscopical examination. He went on to give some statistics and data regarding the loss of live stock, the financial loss and the mortality of the disease.

Considerable discussion followed Dr. Lemke's remarks, and the doctor was subjected to a rigid cross examination by most of the members present, all of whom expressed a willingness to assist him by every means in their power.

The next event on the program was the reading of a very instructive paper on "Bronchitis" by Dr. D. F. Fox, who described the different phases of the disease and the different methods of treating same.

Dr. J. H. Eddy followed with an excellent and carefully prepared paper on "The Circumstances which Modify the Action of Medicine." Both subjects were thoroughly discussed by the members.

On motion by Dr. Spencer a vote of thanks was tendered the essayists for the able and masterly manner in which they had entertained the meeting.

Under the head of new business the chair appointed the following named gentlemen as essayists for the next meeting: Drs. Spencer, Jr., Skaife, Pierce and Shaw.

Dr. R. A. Archibald submitted the following resolutions:

WHEREAS, The live-stock interests of this State are suffering from the malignant influences of contagious and infectious diseases, and

WHEREAS, The health of the public of this great State is also jeopardized by the presence of said contagious and infectious diseases which affect the domestic animal, and

WHEREAS, We, the members of the California State Veterinary Medical Association realizing that this state of affairs is wholly due to the fact that there are no laws on the statute books of this State sufficiently adequate to control the ravages of these contagious and infectious diseases; therefore

Be it resolved, That the president be and he is hereby authorized and requested to appoint at the next meeting of the association, which will be held in Sacramento, a committee consisting of three members, whose duty it shall be to wait on or communicate with the governor of this State with a view of prevailing upon him to appoint a commission, to consist of one veterinarian, one physician, one lawyer, one dairyman and one stockman, who shall receive no compensation, and whose duty it shall be to devise ways and means whereby the public health and the live-stock interests of the State may best be protected from the ravages of contagious and infectious diseases, such as anthrax, tuberculosis, glanders, hog cholera, etc.

Considerable discussion followed the presentation of the resolution and the author was highly complimented for his ingenuity in drafting the same.

Upon motion by Dr. Spencer, Sr., the resolution was unanimously adopted.

There being no further business to come before the meeting, on motion by Dr. Fox the By-laws were suspended and the meeting adjourned to meet in Sacramento on Tuesday, September 10, 1895.

R. A. ARCHIBALD,
Secretary.

On Thursday, June 13, 1895, the members of the California State Veterinary Medical Association assembled by invitation of Dr. C. B. Orvis at his infirmary, at 258 Lafayette street, Stockton, to participate in a clinical entertainment.

The first operation on the program was the reduction of a ventral hernia by Dr. H. A. Spencer assisted by Dr. Archibald. The operation was the radical one for the cure of a hernia and was performed under strictly antiseptic and aseptic rules.

The next operation was performed by Dr. Lemke. This was a case of an old long standing fracture of the scapula at its upper third, from which a fistula resulted which necessitated the trephining of the scapula.

Other operations of minor importance followed, closing the entertainment, which was voted an entire success by the members present.

R. A. ARCHIBALD,
Secretary.

GRADUATION EXERCISES.

COMMENCEMENT EXERCISES OF THE VETERINARY DEPARTMENT OF HARVARD UNIVERSITY.

At the Annual Commencement of the Harvard Veterinary School, the following list of graduates received their diplomas: Ernest Sixten Arvedson, Edward Doane Barrows, Robert Lander Bartlett, Clarence August Carr, A. M.; Walter Stroud Coleman, Dwight Ward Dickinson, Percival Edgelow, Jacob Austin Furfey, Marcus Littig, Frederic Everett Meader, Richard Dyer Milliken, Robert Tucker Moffatt, Henry Clinton O'Brien, Patrick Henry O'Connor, Francis Wheeler Rice, Leopold Scheuermann, Arthur Hale Woodcock.

COMMENCEMENT EXERCISES OF THE ONTARIO VETERINARY COLLEGE.

One hundred and fifty graduates received their diplomas at the Annual Commencement of the Ontario Veterinary College. Dr. Andrew Smith, principal of the college, in his introductory remarks, said that from the time of the origin of the college in 1866 until two years ago there had been a gradual increase in the number of students attending the institution. In the last two years, while there had been a considerable falling off in the number of students, the extent of country represented by them was greater than ever before. The college had among its students representatives of all parts of Canada, the United States, the West Indies and Great Britain.

Dr. Duncan, who acted as secretary, read the list of graduates, honor and prize men. The medals and prizes were presented by the Lieutenant-Governor and others of the visitors present, after which brief addresses were delivered by the Lieutenant-Governor, Principal Caven, Dr. Clark, Mr. Withrow and Dr. May.

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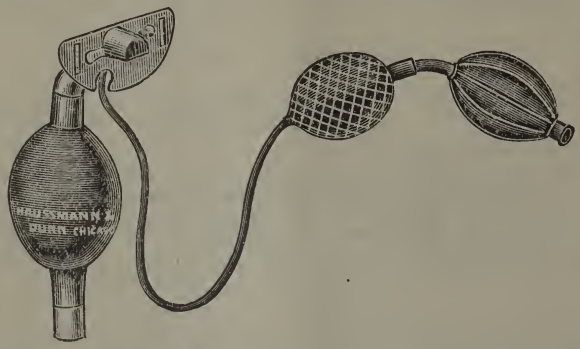

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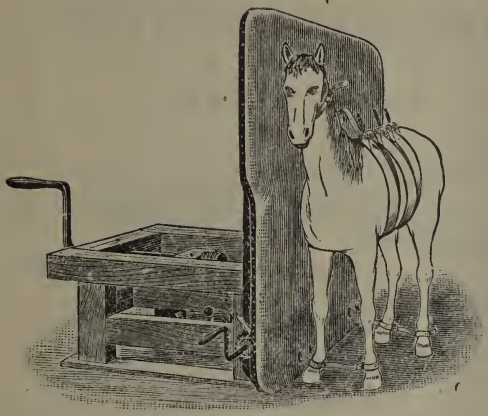

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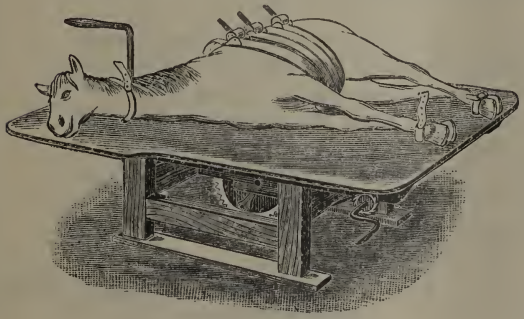

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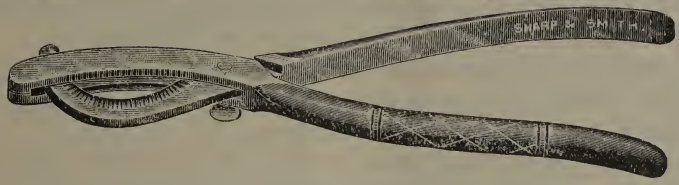

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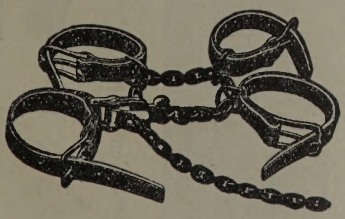

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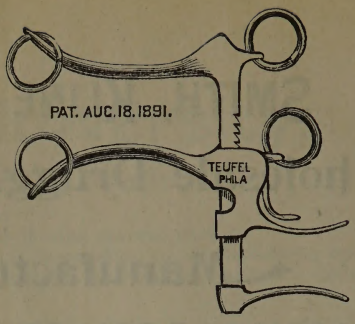
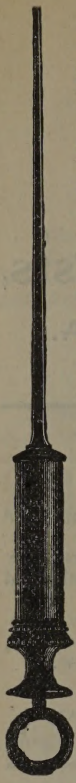


Edward's Speculum with Bridle, $6.00.



One-half oz. Hard Rubber Syringe, long nozzle, $1.00; Per dozen, $8.50.

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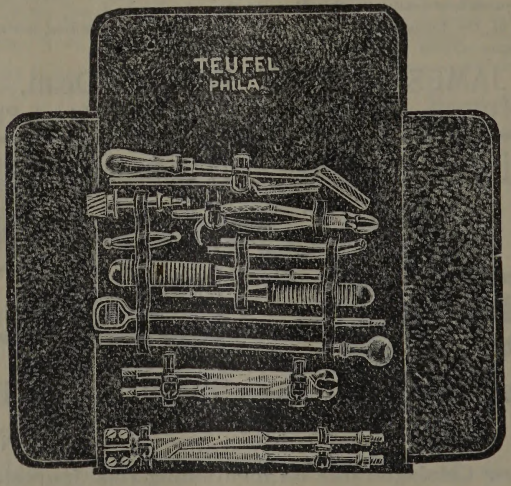

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THIRD—I claim to remove that jar or painful feeling from the horse's foot which is now caused by our present system of shoeing. The weight of the horse resting on the walls of the foot and the shoe almost generally elevated on the corks, namely, two heel-corks and a toe-cork.

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FIFTH—I also claim that my pliable rubber pad will cure corns, bruised heels, separation of the wall of the foot, quarter-cracks and sand-cracks. The pad will also protect weak and tender feet, and prevent the picking-up of nails.

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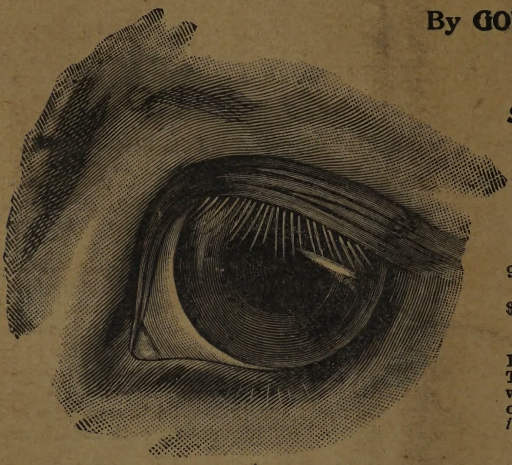

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